

THE Chemical Age

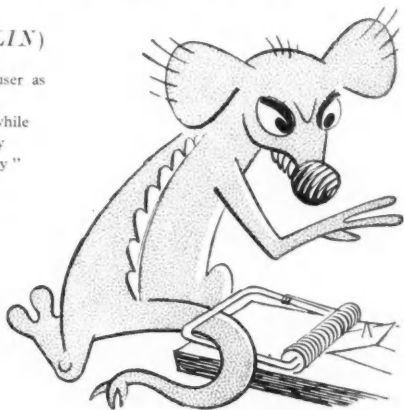
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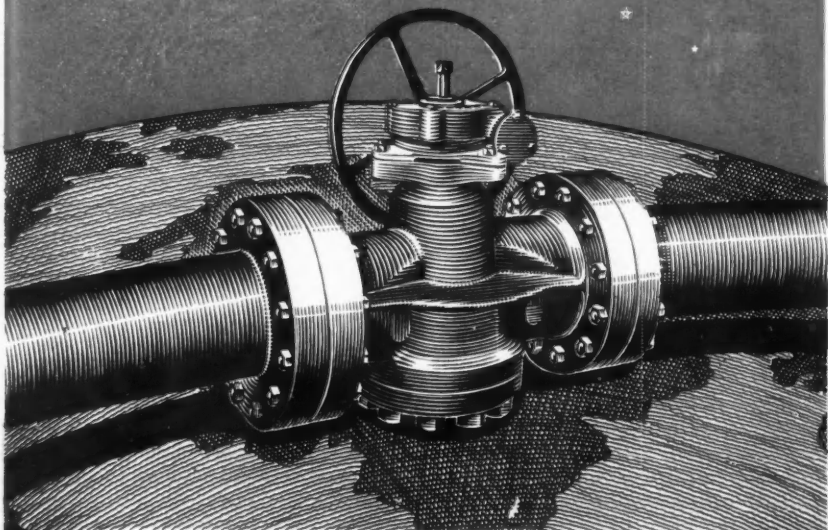
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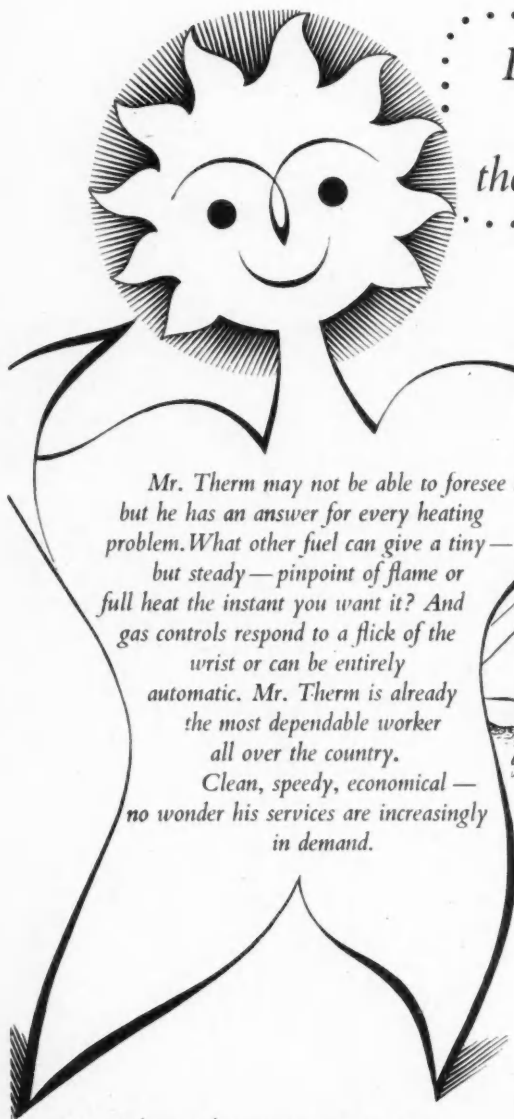


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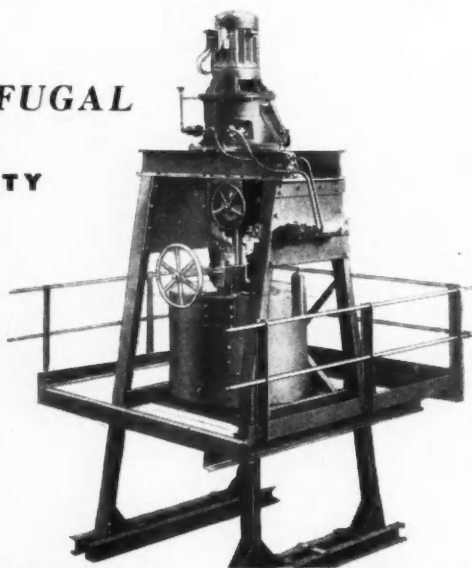
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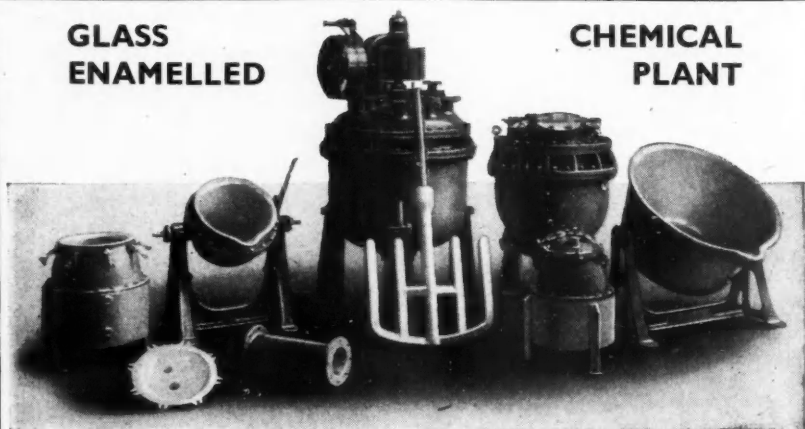
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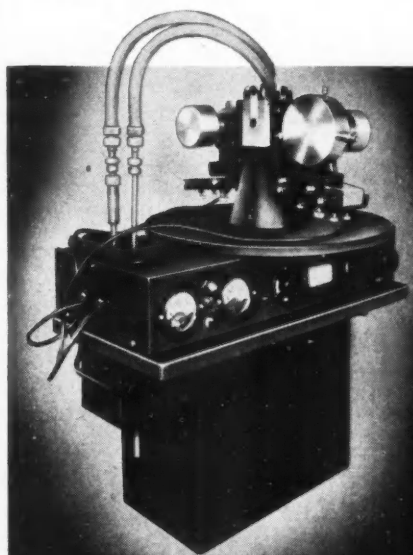


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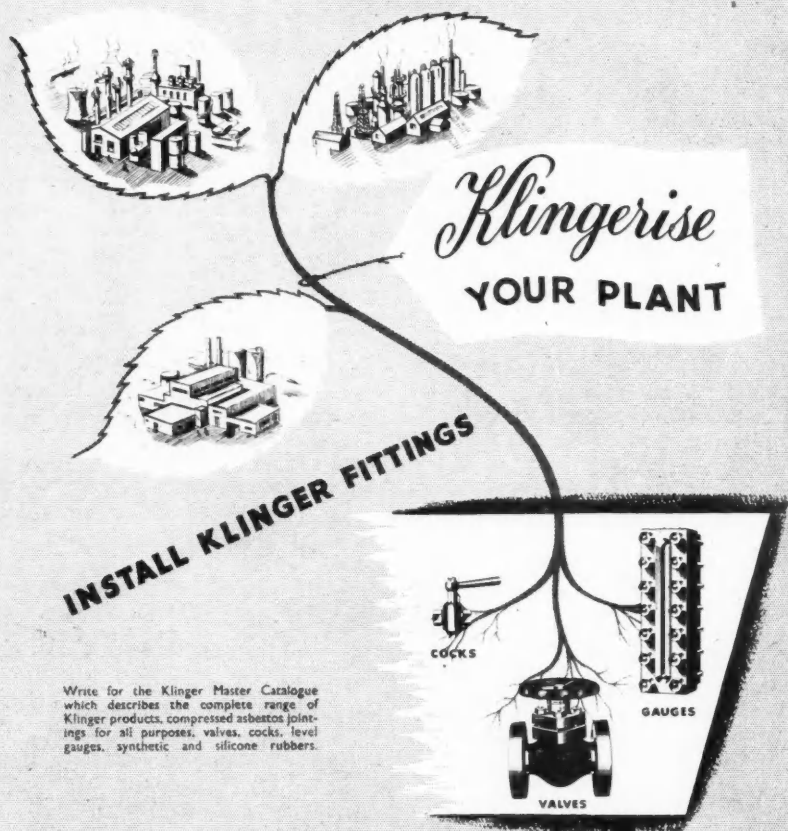
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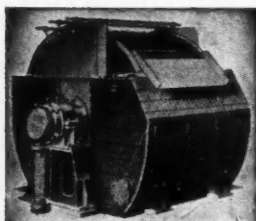
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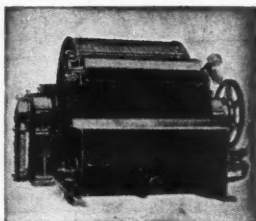
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Wood Sugar

THE wood-sugar industries, more than any other, will lead us into the new Age of Wood.' So wrote Egon Glesinger of FAO, the world's most indefatigable advocate of total wood utilisation, seven years ago. Nevertheless, the story of wood-sugar has been a chequered one, and few of the wartime developments have survived. The production of edible fodder from wood hydrolysis has waned with the greater availability of cereal feeding-stuffs; the fuller chemical processing that converts hydrolysed cellulose into alcohol has not significantly competed with alcohol derived from grain or oil.

The conversion of wood cellulose into alcohol, especially of cellulose in sawdust, was a much cherished hope of German strategy in both world wars. Its complete technical failure in 1917-18 did not prevent revival by the Nazi regime, and huge sums, not all of them of German origin, had been expended on the Bergius process by 1939. The Bergius plan aimed at the total chemical utilisation of wood. Twenty per cent of the wood was to be converted into glucose, 45 per cent into alcohol or fodder for cattle, and the remainder, mainly lignin, was to be developed as a raw material for plastics. Many problems were encountered at the Rheinau factory, notably that of metallic corrosion by strong hydrochloric acid. The Scholler process simultaneously developed in Germany in which dilute sulphuric acid was used as the hydrolysing agent, was much less costly to operate although it gave lower yields. It was this process that America developed during the war, abandoning it soon after VJ day and before any full-scale operation had been accomplished.

When further German progress with the Bergius process was studied after the war by the Allies, the general verdict was that it was still uneconomic.

Since the end of the war, however, the Bergius or Rheinau process has been considerably amended, and it is possible that a major turning-point in the story of wood sugar has now been reached. The German product-aim has changed to dextrose, now mainly produced from maize. Dextrose, with its uses as a sugar in food processing and its other uses as a chemical raw material, is regarded as a safer economic target than molasses for cattle feeding. It is claimed that even with a 20 per cent fall in the price of maize, dextrose from wood can still compete with corn dextrose. The 1952 version of the Rheinau process is reported to give an 85 per cent theoretical yield of dextrose. Unfortunately sawdust cannot be used as the starting material; waste wood must be fed in the form of chips. The attractiveness of wood dextrose manufacture would be much increased if further developments enable sawdust to be fed to the first hydrolysing chamber.

The initial hydrolysis is a partial treatment with dilute (1 per cent) hydrochloric acid at 130° and under pressure; this separates hemicellulose, which can be evaporated to molasses as a cheap cattle food or fermented into alcohol. The residual wood is dried and then given the principal hydrolysing treatment, a 10-hour counter-current digestion with 41 per cent hydrochloric acid at low temperature (21°). The lignin is removed at this stage and since it has been separated at low temperature it is suitable for use in the synthetic

resin industry. The sugar-acid solution is then separated by triple vacuum evaporation, much of the hydrochloric acid used being recovered. A 70 per cent solution of sugars is obtained, mainly in di- and tri-saccharide form. A third and mild hydrolysis converts these sugars into dextrose, which is finally demineralised by ion exchange, purified, decolourised, and crystallised.

An estimate of costs in dollars and based upon smaller-scale operation of the process in Germany has been given in *Chemical Engineering* (1954, 61, [2], 138-140). A total production cost for wood dextrose of \$5 per 100 lb. of crystallised dextrose hydrate is budgeted; a comparable figure for corn (maize) is \$5.82 plus or minus \$1 for variations in returns from by-product sales. If this balance between the two routes to dextrose seems tightly drawn, tautness is relieved by the fact that the wholesale price for dextrose averaged about \$7.3 per 100 lb. in 1952, and over a 20 year period dextrose prices have not varied nearly as erratically as those of agricultural products. However, it would seem probable that the appreciable advent of wood dextrose in a market formerly dominated by maize dextrose would lead to a bitter price-cutting struggle that must damage a new industry more deeply than established industry. From the wider viewpoint of utilising national assets, it is obviously preferable to make dextrose from waste wood and release maize for other nutritional uses, provided, of course, that production costs are closely comparable for both wood and maize. The present time would hardly seem propitious for a further wood sugar venture in the United States as grain is piling up in dollar-bound surpluses.

In Britain there is a substantial tonnage of waste wood. It has been estimated as at least 480,000 tons per annum, not allowing for substantial wastes produced from imported unsawn timber. Returns from 328 firms for a Board of Trade survey in 1947 indicated a waste wood tonnage of 60,000 tons per year arising at these relatively few centres. Much of this tonnage was in the form of sawdust and shavings, probably because chip waste was utilised by the firms as cheap fuel. Hitherto the view has been taken that

wood hydrolysis would not be economic in Britain. The improvements claimed for the Rheinau process may be well worth examination. The chemical industry would derive indirect benefits for there is a much wider use of chemicals in the wood hydrolysis method than in the maize process, 60 per cent of primary raw material costs as against something of the order of 3 per cent; indeed, the cost of hydrochloric acid used is almost twice the cost of the waste wood so that the process could be more logically regarded as converting acid into dextrose.

The outstanding query is probably the corrosion of plant by hydrochloric acid. How far this has been remedied is not clear, but considerable progress is certainly indicated by the fact that the estimated annual maintenance cost for a large-scale plant is given as 6 per cent together with a depreciation cost of 10 per cent per annum. Strong acid is used in only one of the hydrolyses and the associated temperature is very low. In the past 10 years there has been sufficient advance in plant materials technology for it to be assumed that problems of this kind are far more easily solved.

The prospects of successful development here would be greatly enlarged if sawdust and not chips could be used. This is not primarily a matter of cost for the price set against wood chips is only 8 per cent of the production cost of the dextrose; it is a matter of supply and waste utilisation. It is sawdust that accumulates most heavily at centres of wood-handling, and some dumps in Scotland are estimated to contain 20,000 tons or more each. Even the additional cost of a pre-feeding process to pelletise or briquette the sawdust might not seriously diminish the margin between profit and loss.

Certainly the least to be said is that these new German developments should be closely watched. It would not be unique for the turning-point between failure and success to arrive after 20 years of troubled discredit. There is nothing more inevitable, too, than the fact that wood cellulose will not continue to be wasted so heavily by mankind. At some time in the future its conversion into edible sugars and alcohol must become the regular practice.

Notes & Comments

Where There's Smoke . . ?

LAST week there was brought to Britain a tinge of the controversy that has been violently raging for months in the United States on the subject of tobacco and cancer of the lung. There in 1953 sales of cigarettes fell by 1.1 per cent although for 30 years with only three exceptions there has been an annual rise of between 4 per cent and 6 per cent. There recently, too, the American Medical Association announced that its journals will no longer carry advertisements for cigarettes. Yet in linking the rise of lung cancer with smoking we are in the realm of half-facts and indications. On so serious a matter the Minister of Health has felt it right that the public should be informed of the present state of research. Most people will agree that the opinion of the Medical Research Council's special sub-committee should have been publicised. Nevertheless, it is always dangerous when questions that are still *sub judice*, legally or scientifically, are widely opened to public debate.

Not Fully Proven

STATISTICAL clues lead in more than one direction. It may be true that lung cancer claims a majority of victims among male smokers. It is also true that it claims more victims in cities and towns than in rural areas, and among men far more than among women. Yet much of the rise of cigarette smoking since 1940 can be attributed to the female sex, a fact for which there is perhaps no statistical evidence but which most people will know to be true from their own observations. On statistical evidence alone, the case is not fully proven. The most critical evidence put forward in America is in a 1953 paper that reported the production of carcinoma in 41 per cent of mice whose skins were treated regularly with tarry extracts from cigarette smoke. This is a repetition of the much older work on coal tar; the painting of mice skins with benzantracene compounds from coal tars also produced carcinoma. But careful thought is needed

before we rush to the conclusion that cigarette smoke = cancer of the lung. The age-old question of dosage is involved. The tarry extracts applied to mice were concentrated doses and even then the time taken (in terms of a mouse's lifetime) before carcinoma developed was appreciable. What is the dosage rate involved in normal cigarette smoking?

Clues Not Proof

NOW that this subject is wide open to public debate, the presentation of counter-argument will be regarded by many as prejudice in favour of the tobacco industry. The offer of £250,000 for research by that industry is a commendable action that should be above misinterpretation. The Chancellor of the Exchequer might well consider giving a similar amount, for his problems are quite as serious if people start smoking less! The sooner we pass from half-facts to real facts the better. Immediate research should centre upon isolating the active ingredients of tobacco smoke tar that seem to promote carcinoma with mice. The amount of active ingredient that is carried in cigarette smoke should then be ascertained. Side by side with this the potentialities of tarry substances produced by internal combustion engines and dispersed into the air should be investigated. Meanwhile it seems reasonable enough that individuals should make their own decisions whether or not to risk smoking. They should be left in no doubt, however, that so far the verdict of science is based upon clues and not upon proof. That is not said to be fair to the tobacco industry. It is said to be fair to science and scientific methods about which there is still more public misunderstanding than understanding.

Mexican Sulphur

SULPHUR production in southern Mexico seems likely to become an important factor in the world's future sulphur situation. The plans already going ahead for 1954 are reported (*Chemical Week*, 1954, 74, [4], 16) to involve an output second only to that of

the United States. The Mexican Government, taking a royalty of 10 per cent on every ton mined, is not discouraging the development of domes by US companies. The Frasch process is mainly being applied, so it can be reasonably assumed that Mexican sulphur will be a genuine addition to the supply of low-cost sulphur. A \$5,000,000 plant built by the Pan American Sulphur Co. is scheduled for opening in October with an initial annual capacity of 400,000 to 600,000 tons. The Mexican Gulf Sulphur Co. has a new plant already completed and it is believed that it will produce 500 tons of sulphur per day. Another US company, Texas International, is interested in two Mexican projects—a 25-tons per day mine (non-Frasch) due to start production in April, and a Frasch mining plant that will come into existence a good deal later. A fourth company, Gulf Sulphur, has already drilled about 20 wells and found enough sulphur to justify full-scale exploitation.

Dramatic Improvement

It is not more than a few years ago that the end of the Frasch process for low-cost elementary sulphur was grimly but generally predicted. The existing domes of Texas and Louisiana were the only sites where the process could be economically operated and at the post-war rate of mining their reserves

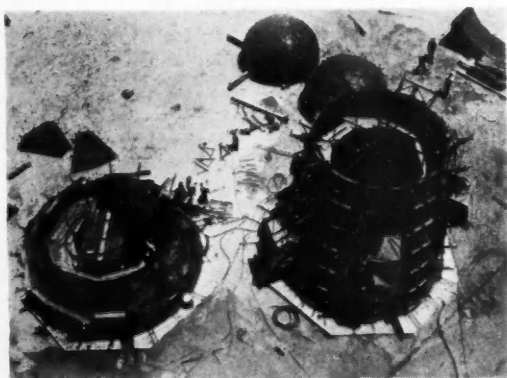
of the element could not last more than another 10 or 15 years. That picture has brightened with dramatic rapidity. Not only have new domes come into active operation in the United States, but now this obviously large source of sulphur on the South American side of the gulf is being brought into production. The relatively small price rise for sulphur has been a low fee to pay if it has stimulated these new developments. In an age of economic artificialities it is a striking example of the ancient law of supply and demand in speedy and effective operation.

A Different Picture

It is the reverse side of this brighter outlook that will be observed in Italy. So long as the low-cost Frasch process can be applied to new domes, no sizeable revival of a conventional sulphur-mining industry is likely. Italy's prospects of re-entering the world sulphur market as a major supplier have flickered out in three years; yet at the peak of the post-war sulphur shortage the Sicilian opportunity looked promising enough.

Australian Pitchblende

The first sample of pitchblende taken from the new South Australian find in the Adelaide Hills is to be processed at the pilot treatment plant at Adelaide. Regular consignments will go to Adelaide after completion of a road now being built from the site to the town.



This recent picture shows sections of the combined reactor-regenerator vessel of the catalytic cracker at the new Kwinana oil refinery now under construction for Australasian Petroleum Refinery Ltd., an associate of Anglo-Iranian Oil. The vessel, which is being assembled prior to being lifted into position, will be 120 feet high when erected

Use of Toxic Chemicals in Agriculture

Government Accept Working Party's Proposals

SIR THOMAS DUGDALE, Minister of Agriculture, announced in a Parliamentary reply on Tuesday, 9 February, that the Government broadly accepted the recommendations in the second report of the working party, under the chairmanship of Professor S. Zuckermann, on the use of toxic chemicals in agriculture.

'Since many departments are concerned with different aspects of this problem,' he said, 'an inter-departmental advisory committee is to be set up to keep under constant review all risks that may arise, and to make recommendations to the Ministers concerned. The committee will have an independent chairman, and Professor Zuckermann has agreed to accept this appointment for an initial period.'

Possible Risks

The report, 'Toxic Chemicals in Agriculture: Residues in Food' (HMSO, 1s. 6d.) is the second made by the working party, the first having been on the risks to workers applying toxic chemicals on farms (THE CHEMICAL AGE, 1951, 64, 337), and deals with the possible risks to consumers from the use of toxic substances on agricultural products and in the storage of food.

The contamination of food by metals is being examined by the Metallic Contamination Sub-Committee of the Food Standards Committee of the Ministry of Food (see p. 470), and since the identification of the older toxic compounds of lead, arsenic or copper presents no problems to the analyst, the working party considered it unnecessary to discuss them further. They therefore turned their attention to compounds which have been introduced in recent years, such as DDT, BHC, parathion, TEPP, schradan, tecnazene (tetrachloro-nitrobenzene), propham (iso-propyl N-phenyl carbamate) and DNC, and also considered the dangers arising from the use of chemical and bacterial rodenticides.

Forty-five trade and professional organisations were approached for evidence, and replies were received from 21. Of these, 14 were invited to give oral evidence.

The working party have arrived at the following conclusions:

1. Efficient agricultural practice necessitates the use of various chemicals in order to protect growing and harvested crops. No evidence has been received of any fatal or non-fatal illness which can be attributed to the presence of toxic chemical residues in food entering the market.

2. Special attention must be paid to possible risks of staple articles of diet being contaminated, particularly as little is known of chemicals used abroad on food which is imported.

3. Bacterial rodenticides may create special risks.

4. Although many manufacturers already take some precautions to assure themselves that there is no risk if their products are properly applied, and most contractors follow a strict code of practice, there is evidence that there are components in commercial use about whose residues on food little is known.

Recommendations by the working party included: that a general statement should be issued by the departments concerned (the Ministry of Agriculture and Fisheries, the Ministry of Food, the Ministry of Health and the Scottish Home Office) that proposals for the use of new toxic substances should be notified to them; that advice should be available from the agricultural departments; that further research should be encouraged; and that improved methods of analysis should be developed by the Government laboratories in collaboration with the Society for Analytical Chemistry.

Restriction of Bacterial Rodenticides

With regard to bacterial rodenticides, the report recommends that they should be restricted to those containing the *danzys* variety only of *Salmonella enteritidis*, that they should not be permitted on premises in which food is prepared or sold, that they should be employed only by skilled operators, and that unconsumed baits should be removed.

Sir Thomas Dugdale also told the House of Commons: 'Preliminary discussions with the Association of British Insecticide Manufacturers suggest that . . . it should

be possible to arrange for their members to notify proposals for new toxic substances . . . which involve toxic hazards. It is hoped and expected that these and similar voluntary arrangements will obviate the need for any statutory requirement of notification.

'The Government are considering, in consultation with the interests concerned, the suggestion that the use of bacterial rodenticides should be discontinued. . . . The companies using them have agreed to adopt, with minor modifications, the precautions recommended in the report, the chief of which are already part of their current practice. They have also offered to collaborate with the appropriate departments, who will keep the matter under close review.'

The other recommendations in the report have been accepted, and appropriate action will be taken.

ABCM Stand at BIF

Twenty Firms Co-Operating

OVER recent years there has been a decline of interest among exhibitors in the Chemical Section of the British Industries Fair at Olympia. As a result, the Association of British Chemical Manufacturers are giving thought to what should be the industry's future policy in regard to national exhibitions. Two committees have been set up—one to examine and report upon the feasibility of promoting separate specialised exhibitions for the industry; the other to review what form the industry's representation should take if it is decided to continue to take part in the BIF either at Olympia or Birmingham.

In the meantime, it has been decided not to exhibit at the Olympia Section of the BIF this year. The possibility of exhibiting experimentally at Birmingham has, however, arisen, and it has been decided to have an ABCM stand at Castle Bromwich, on which 20 of the leading chemical companies will have separate display units.

There may be a closer affinity between the chemical industry and those industries which habitually exhibit at Birmingham than there is between the chemical industry and those which normally show at Olympia. In any

case, the ABCM hope that the chemical industry's stand at Birmingham this year will provide members with an opportunity of assessing the advantages of Birmingham as an exhibition centre.

The firms who have agreed to participate in the stand are as follow: Albright & Wilson Ltd., A. Boake, Roberts & Co. Ltd., British Drug Houses Ltd., Borax Consolidated Ltd., British Glues & Chemicals Ltd., British Titan Products Co. Ltd., W. J. Bush & Co. Ltd., Coalite & Chemical Products Ltd., Joseph Crosfield & Sons Ltd., Distillers Co. Ltd., Hickson & Welch Ltd., Imperial Chemical Industries Ltd., Imperial Smelting Corporation Ltd., Laporte Chemicals Ltd., Marchon Products Ltd., Monsanto Chemicals Ltd., Shell Chemical Manufacturing Co. Ltd., Peter Spence & Sons Ltd., John & E. Sturge Ltd., United Coke & Chemicals Co. Ltd.

KID Exemptions

THE Treasury have made an order continuing from 19 February until 18 August the exemption from Key Industry Duty of all the articles exempted from that duty by previous orders which expired on 18 February, with the addition of:

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The Order is the Safeguarding of Industries (Exemption) (No. 2) Order, 1954, and is published as Statutory Instruments 1954, No. 150. Copies may be obtained (price 4d. net, by post 5½d.) from HM Stationery Office, Kingsway, London, W.C.2, and branches, or through any bookseller.

Fertiliser from Sea-water

A Dutch-Norwegian experimental plant for the extraction of fertiliser from sea-water is about to go into production at Ijmuiden, Holland.

Move to Reduce Detergent Prices

Private Members' Bill Introduced in House of Commons

IN the House of Commons last week, Sir Richard Acland introduced a Private Members' Bill 'to reduce the retail price of Surf, Daz, Fab, Persil, Tide and other soap powders, soap substitutes, detergents, etc.' He said it was the first of what he hoped would be a series of such Bills designed with the 'simple and laudable' object of reducing the cost of living.

Displaying emptied packets of three brands of detergent, Sir Richard stated the present prices and the reduced prices he and his supporters proposed, the reductions being 2d. on small packets and 4d. on the larger ones.

One packet Sir Richard described as 'very remarkable,' because on the back of it would be found a money-saving coupon, which, he continued, 'is an infernal nuisance to the grocer or ironmonger, with which one would be entitled to purchase a 1s. 11d. packet of this substance for 1s. 5d. That is not the only way in which one can come across these coupons. This one, for example, was put through my front door on Friday, and with it one can get two large packets of Tide for 1s. 6d. In this connection the word "large" is a trade term meaning small, because it refers to the shilling packet . . .'

A Remarkable Packet

Sir Richard displayed another packet which he also described as 'remarkable' because he did not pay anything for it. He was one of a number of householders in a particular street who found that a free packet of Daz had been left on the front door step. Sir Richard continued:

'More than £2,500,000 is spent each year on advertising these things in the Press, not to mention posters, free distribution and the competitions in which houses worth £4,000 and cars with several hundred pounds worth of petrol are given away as prizes. We have no objection against the quality of these products, although I think that the manufacturers will agree that it is best to use some of them in rubber gloves. And I will agree that a couple of years ago when detergents first came on the market, there was nothing seriously wrong in spending money to tell the public about them.

'The principle behind this Bill is this: We have reached the stage when we, as responsible representatives in our constituencies for the housewives, have got a right and a duty to say that the leaders of privately-owned big business shall not play the fool with public money any longer, but should cut down this advertising to reasonable proportions, and should do what is manifestly wanted, namely, reduce prices.'

An Age of Blessings

He contended that the money paid for detergents and soap powders was every bit as much public money as money paid for railway tickets or for education through rates and taxes. Sir Richard went on: 'These detergents are invented by scientists and chemists who work for salaries. We are indeed very lucky that we live in an age when these blessings are made available to us by these working men, and I think it is silly that these playboys of the big business world should now stand in the way of the ordinary housewife getting these things at the cheapest reasonable price'.

Mr. Harmar Nicholls said he would hate to believe that Sir Richard Acland was so naive as to think that merely by the Government producing a Bill such as that being debated they could set about reducing prices. Past experience showed that when the Government took control of industries in that way, far from prices being reduced they were very much increased. In no field had that been proved more completely than that of soaps and detergents. Controls were applied to them in 1942 and in the ten years of their existence prices did nothing but rise.

After quoting increases in the prices of detergents and soaps during the control period, Mr. Nicholls gave instances of price reductions since the removal of control and continued: 'As far as detergents are concerned, whilst there has not been any great reduction in cost, it is clear that the quality has improved so much that the housewife is getting much better value than before.' He suggested that, as regards price reductions, the policy that he presumed would be included in the proposed Bill was one which, on evidence, had increased prices and not reduced them.

Saying that he failed to understand the antipathy of Sir Richard Acland to the energy shown by manufacturers as reflected in their advertising campaigns, Mr. Nicholls contended that it was not the fact that if money were not spent on advertising the manufacturers could bring down the cost of the article. What advertising did was to put the various manufacturers of the same product in competition with one another. The result of keen competition was that detergents were now of much better quality and prices had been kept down.

Talk about monopoly did not bear examination. There were five big concerns and about 200 small ones, all in keen competition with one another. In the case of the five big firms, there was no question of a friendly ring set up to exploit the consumer, because among the five firms there was fierce and keen competition.

On the question being put and agreed to, the Bill was presented and read a first time.

An Unusual Order

THE production, at a few hours' notice, of a complete set of biological stains for the diagnosis of any type of disease or organic disorder likely to be encountered by human beings on an Arctic island was the problem recently presented to Mr. Edward Gurr, managing director of Edward Gurr Ltd., 42 Upper Richmond Road, East Sheen.

A brief radio message requested that a compact yet comprehensive set of stains be put on board a vessel leaving an English port the next day for the Arctic island where the stains were required in a whaling station hospital. As no specific stains were mentioned by name in the message and the company produces about 1,500 different stains for diagnosing diseases, something of a problem was presented. However, a selection was made of stains considered to be most useful for use in Arctic conditions and the consignment was loaded on board the transport ship in time.

Mr. Edward Gurr is the author of several books on microscopic staining techniques and is regarded as a leading authority on the preparation and application of these highly specialised products.

Optical Pyrometers

Standard Code Prepared

THE disappearing-filament optical pyrometer occupies an important position in the field of high temperature measurement. In the metallurgical, heavy chemical and coking industries it is used either directly as the temperature-control instrument or as the reference standard for other instruments. It is thus important that these pyrometers should be highly accurate and reliable. In order to make known the possibilities of improved design the British Standards Institution has published a British Standard Code for Disappearing-Filament Optical Pyrometers (BS. 2082).

The code should prove useful both to manufacturers and users of optical pyrometers, for a wider field is covered than simple recommendations on design. The reasons for certain features of design are fully discussed and this has led to the inclusion of a summary of the basic principles of optical pyrometry; in order, however, to avoid digression from the main arguments, certain aspects of the subject are separated into appendices, of which there are seven. The main text is divided into five parts under the headings: (1) General (including definitions and a description of a typical optical system); (2) Principles of optical pyrometry; (3) Design requirements; (4) Calibration procedure; (5) Selection and training of operators.

No Rigid Specifications

In Part 3 no rigid specifications are given, but only an indication of the design requirements so that originality of design may not be prevented. Among the appendices there is, for example, a discussion on the precautions necessary in the use of optical pyrometers, including emissivity data and emissivity corrections to be applied to pyrometer readings; another of the appendices considers a scheme for the statistical assessment of observers, while a third sets out the method of calculation of the effective wavelength of the red glass of an optical pyrometer in some special cases, this being in continuation of the discussion on this subject in the main text of the code.

Copies of this British Standard (6s.) may be obtained from the Sales Branch of the Institution, 2 Park Street, London, W.1.

MIDLANDS SOCIETY FOR ANALYTICAL CHEMISTRY

Analytical Problems of River Pollution

AT a meeting of the Midlands Society for Analytical Chemistry held recently in Birmingham, G. Knowles and A. B. Wheatland, of the Water Pollution Research Laboratory, Watford, introduced the topic 'Analytical Problems of River Pollution.'

The passing of the Rivers (Prevention of Pollution) Act, 1951, which gives Rivers Boards power to prescribe standards determining what may be discharged to rivers, has emphasised the need for suitable methods of analysis for effluents and for river waters.

Perhaps the commonest type of pollution is that which disturbs the balance of life in a river by lowering the oxygen content of the water. When waste waters containing organic impurities are discharged to a river, bacteria bring about decomposition and oxidation of the organic matter, and in the process considerable quantities of dissolved oxygen are removed from the water.

Fish and other aquatic organisms need a minimum concentration of oxygen for respiration, and species differ in their ability to tolerate the low concentrations which may occur in polluted rivers. Carp will survive for 12 hours in water containing 0.5 ppm. of oxygen at 17°, but these conditions are rapidly fatal to rainbow trout. It is known also that a reduction in the concentration of dissolved oxygen to a level which is not in itself lethal can increase the toxicity of some poisons (e.g. cyanide and ammonia), and such factors may account for the dominance of some species in polluted parts of rivers while other species predominate in cleaner zones. Since so much may depend on the oxygen content of a river, measurements of the dissolved oxygen concentration of the water and of the power of wastes to consume it are of much importance in pollution studies.

A second type of pollution causes poisoning, as distinct from asphyxiation, of life in a river; this may be because a discharge is too acid or alkaline or contains traces of substances such as cyanides, heavy metals, ammonia, or insecticides, all of which are highly toxic to fish and other aquatic life.

Other types of pollution can change the appearance and value of a river without necessarily causing the death of fish. For

example, discharge of fine suspended matter such as china clay may render the water turbid and may smother life by accumulation of solids, while wastes from dye works may make it highly coloured and unsightly.

In recent years new troubles have arisen owing to excessive foaming when effluents containing synthetic detergents have been discharged to rivers. Other types of pollution may impart unpleasant tastes to a water immediately or when the water is treated for domestic use. Traces of phenolic substances in particular give rise to very strong tastes in water which is chlorinated. Pollution with pathogenic bacteria may prevent the use of water for recreation and involve costly treatment if the river is used as a source of water supply.

Whatever the type of pollution, however, the main concern is the effect the pollution has on the suitability of the water for its normal use. For this reason, in studying pollution problems the methods of analysis used are often not intended to determine the concentration of any specific substance in a discharge but rather to indicate the effect of the discharge on some property—such as, toxicity or oxygen-absorbing capacity—of a river.

When Rivers Boards prescribe standards to which discharges will have to conform, the tests may well be of this type. There are so many potentially harmful constituents of liquids discharged to rivers that standards based on concentrations of them taken individually would often be impracticable. In specific cases, or for routine purposes, a special determination of a single constituent might be useful, but in general it seems likely that tests will be adopted which will measure some general property of a polluting liquid.

Use of Fish

Determination of the toxicity of a waste water in the laboratory is by no means a simple matter, as fish vary individually in their resistance to poisons, and their resistance can vary with the chemical and physical characteristics of the water to which the poison is added. Information on the effects

of toxic substances on fisheries is much needed, however, and the Water Pollution Research Laboratory and the Ministry of Agriculture and Fisheries are working together on the subject.

Two kinds of observations are involved in this work—surveys of the fish population of streams polluted with toxic substances and laboratory studies of the toxicity of the same poisons. The aim of the work is to develop a standard test which can be applied in the laboratory to assess the toxicity of an effluent; ultimately it is hoped to be able to predict the effect on fish of discharging such an effluent—or rather a number of such effluents—at given rates to a given stream.

The laboratory experiments have been made in flowing water in a tank in which temperature and concentration of dissolved oxygen can be kept constant and the concentration of poison being tested can be accurately controlled. The tank was made large enough to hold 50 fish so that the results could be analysed statistically to allow for variations in the resistance of individual fish. From the results of a series of experiments with this apparatus, in which potassium cyanide was used as the poison, it has been shown that in low concentrations, the relation between period of survival and concentration of poison can be expressed by a relatively simple formula; this formula, however, does not hold when the concentration is increased and the period of survival is reduced beyond a certain critical limit^{1,2}.

Importance of Sampling

In many cases the greatest errors in predicting the polluting effect of an effluent arise not in the analysis, but in the technique of sampling. A fundamental difficulty is that a river is not a stable system and changes are continually taking place. There are usually continuous variations in the rate of flow of the river, in the rate of flow and strength of wastes discharged to it, and in the capacity of the river to recover from the effects of pollution. Recovery is controlled mainly by the rate of reoxygenation of the water, which is affected by atmospheric conditions; wind, for example, affects the turbulence of the surface and thus the rate of entry of oxygen.

The effects of respiration and photosyn-

thetic activity of plants are also of particular importance. During daylight green plants evolve oxygen and help to reoxygenate a polluted river; in bright sunlight the oxygen content of some rivers frequently reaches a value 60 per cent above saturation. Even in an estuary, such as that of the Thames, photosynthetic activity can result in oxygen levels of 40 per cent or more above saturation. During the hours of darkness, however, phytoplankton and larger plants continue to respire and consume oxygen, but there is no photosynthetic activity. Consequently, there is a diurnal variation in the oxygen content of the water.

In view of the influence of dissolved oxygen on the toxicity of certain substances, this variation is important. In considering the pollution of a river, it is not sufficient to consider only the average conditions. If a toxic substance is discharged and fish die, it is of no use to show that the average concentration of a toxic substance is below a certain toxic limit, since the casualties may have been caused by bad conditions lasting for a comparatively short period.

Where an accurate determination of the condition of a river is required it may often be necessary to make observations continuously or at least frequently during periods of 24 hours; clearly there is much scope for the development of continuous recording instruments of different kinds.

Continuous Method of Analysis

An example of the use of a continuous method of analysis is the recording of the residual chlorine concentration in the effluent from a paper mill³. Large quantities of hypochlorite are used for bleaching purposes at paper mills, and where high quality papers are required it is often the practice to wash the excess hypochlorite from the pulp and to avoid the use of anti-chlors, for example sulphite. At such a mill it was desired to dechlorinate the main effluent and information was required as to how the chlorine content varied with time. Examination of snap samples of the effluent showed that both free and combined residual chlorine were present and that the total concentration varied rapidly with time. To follow these variations in detail a continuous recorder was set up which operated on a principle similar to that used by Marks and Glass⁴ to determine residual chlorine.

A sample of the waste water after screening was mixed continuously with buffer solution containing potassium iodide from which iodine was liberated by residual chlorine. The solution of iodine, flowing at a constant rate over a polarised platinum electrode, caused the passage of a current, the magnitude of which was a measure of the concentration of residual chlorine. The current was amplified and measured by a recording instrument. The apparatus was self-cleaning, being designed so that there were no irregularities on which paper fibre could accumulate. Using this technique concentrations of residual chlorine as high as 40 ppm. were found to occur for short periods, although analysis of samples taken every 5 minutes for several periods of 1 hour never gave values higher than 7.5 ppm.

It would obviously be very useful to have some method of recording automatically the concentration of dissolved oxygen in water. In spite of the disadvantages of the Winkler method, it appears to be the one best adapted for automatic recording and an apparatus which appears to be satisfactory has been developed at the Water Pollution Research Laboratory.

In this, an electrical pulse every half minute actuates a stepping switch. This controls the opening and closing of magnetic valves which first cause a sample of water of known volume to be taken in a 'Perspex' cell (fitted with a magnetic stirrer) and then cause the addition of the Winkler reagents in turn. The iodine produced is not titrated, its concentration being registered in terms of light absorption of the solution by means of a photocell, amplifier, and recorder. Allowance is made for any colour or turbidity other than iodine by next adding excess thiosulphate and recording the new light absorption. The whole process is automatic and a new determination is made every 12½ minutes.

Earlier attempts were made to adapt other methods for the continuous recording of dissolved oxygen. A polarographic method was tried and was found to give accurate values for distilled water and tap water not containing chlorine. It was frequently necessary, however, to recalibrate the electrode and it seemed that the method had little prospect of success with river waters.

The best technique seems to be that of Seaman and Allen⁵ followed by Rand and Heukelekian⁶ who measure the polarographic current before and after deoxygen-

ating the sample by passing an inert gas through it. The difference between the two currents is taken to be a measure of the content of oxygen but, as Rand and Heukelekian point out, other gases or volatile compounds capable of contributing to the polarographic current may be removed by the inert gas; they also mention interferences of other kinds. A serious mechanical difficulty is that encountered by Ippen, Yoseph and Posthill⁷ who found that the average dropping-mercury electrode clogs, if used continuously, in about 8 hours, even in clean water. These workers tried a rotating platinum electrode also without much success.

When continuous automatic measurements are impracticable then the necessary information can often be obtained by analysing samples taken automatically at predetermined times. This technique can, of course, be applied only when the property it is desired to measure does not change during storage of the sample. Samples for the determination of suspended solids or of concentrations of metals may be suitably taken in this way, but the method is of no use when samples are required for determination of, for example, dissolved oxygen, ammonia, nitrite, nitrate, free chlorine, or any other constituent which will react rapidly, unless changes in the samples can be arrested, say, by prior addition of some reagent to the bottles. An automatic sampler developed at the Water Pollution Research Laboratory has recently been described⁸.

Some Particular Analytical Difficulties

Many of the difficulties encountered in determining constituents of effluents and surface waters are due to the presence of comparatively high concentrations of interfering substances; other difficulties may be due to the fact that very sensitive methods are required—for example, a fraction of one part per million of the more toxic substances has a significant effect on fish. Other difficulties arise in designing laboratory tests that simulate sufficiently accurately the conditions in a river.

1. *Determination of oxygen demand.* A very common and serious effect of pollution in a stream is a lowering of the concentration of dissolved oxygen; it is therefore very desirable to be able to determine the oxygen-consuming power of an effluent

in the laboratory and, from the result, to predict the rate of oxygen consumption in the river. Unfortunately, the rate in the river is determined to some extent by the varied chemical, physical and bacteriological conditions to which the effluent is exposed as it mixes and moves with the water. Even if the variations in these conditions were known it would be difficult to duplicate them in the laboratory and all laboratory determinations must be inadequate to a greater or lesser degree.

For most routine determinations the 'biochemical oxygen demand' test is used. In this the effluent under examination is mixed with water saturated with dissolved oxygen and the mixture is incubated, usually for 5 days, at 20°, the Winkler method of determining dissolved oxygen being employed to determine how much is consumed during incubation.

Choice of Periods

Although 5 days is the period recommended as standard in 'Standard Methods for the Examination of Water and Sewage' the same authority mentions that a shorter or longer period may be used. A shorter period would perhaps be appropriate when the effluent is present for only a day or two in the part of a river under consideration, and a longer one may be required in considering discharge to an estuary where perhaps 50 days may elapse before most of the effluent has passed out to sea.

A disquieting feature of the biochemical oxygen demand test is that a different result is sometimes obtained if the sample is mixed with river or estuary water instead of with the standard dilution water specified in 'Standard Methods for the Examination of Water and Sewage.' There is some evidence also that if the sample is mixed with estuary water, the result obtained may vary with the salinity of the diluting water.

A difficulty of a different nature, is that conversion of ammonia to nitrite and nitrate may occur in a river in a shorter period than it does in the biochemical oxygen demand tests, or *vice versa*. Since this nitrification can cause a significant rapid increase in rate of oxygen consumption it can result in a false impression being obtained from the laboratory test.

There are thus difficulties in predicting, from the results of tests for biochemical oxygen demand, the rate at which an efflu-

ent will absorb oxygen when discharged to a surface water. Much work on this subject is in progress—a major difficulty being to devise methods of measuring the rate of oxidation occurring in surface waters under natural conditions. In spite of these shortcomings, the test for biochemical oxygen demand is of great value in giving the comparative oxygen demands of different effluents; if it is later superseded, it would be, presumably, by an essentially similar technique, in which oxidation of organic matter is brought about by the activity of bacteria, under conditions simulating as nearly as possible those in a stream.

One method of determining oxygen demand is to measure the volume of oxygen taken up by an effluent in a respirometer. By this means the relation of absorption of oxygen to time can be obtained with considerably less effort than by the technique used in the biochemical oxygen demand test. Respirometer determinations are made at the Water Pollution Research Laboratory in connection with work on pollution of the Thames Estuary; in this investigation it is essential to know the amounts of oxygen consumed for all periods from a few hours up to about a hundred days.

A measure of the oxygen-absorbing capacity of effluents can also be obtained by determining the quantity of oxygen absorbed under standard conditions from such oxidising agents as permanganates and dichromates. Tests of this kind are useful in giving a comparison of the oxygen-absorbing capacity of different samples of an effluent of generally constant composition, but it by no means follows that the values obtained for different effluents bear any constant relation to their oxygen demands when they are oxidised by bacterial action in a river.

2. *Dissolved oxygen.* A wide variety of methods has been used for the determination of dissolved oxygen—gasometric, titrimetric, colorimetric, and electrometric. In all work connected with river pollution, however, one of the variations of the Winkler method is generally used. For waters that contain no organic matter or inorganic interfering substances such as nitrite, sulphite, etc., checks against a gasometric method show that the simple Winkler method is accurate. For small samples of water, however, of the order of 30 ml. or less, it is advisable to use an amperometric

method for detecting the end point of the titration, as starch requires about 30 $\mu\text{g.}$ of iodine to give a blue colour detectable by eye¹⁰.

When organic matter is present iodine may be absorbed and serious errors arise. Where the organic matter is in suspended or colloidal form the American Public Health Association recommend a preliminary flocculation, forming aluminium hydroxide, before proceeding with the Winkler determination on the clear supernatant water.

For a long time the Rideal-Stewart modification¹¹ was popular as a method for avoiding interference by organic matter; this modification involves preliminary treatment of the sample with acid permanganate to destroy the iodine-combining power of the organic matter. The evidence presented in the original paper by Rideal and Stewart is not very comprehensive and later publications by Alsterberg¹², the American Public Health Association⁹, and others, indicate that the Rideal-Stewart modification is often unreliable in the presence of sewage or suspended mud; it is of service, however, in oxidising ferrous to ferric iron, as a preliminary to the Winkler determination⁹.

Sulphite interferes with the Winkler method since it immediately reduces iodine, and no satisfactory modification has been advanced to deal with it except perhaps the preliminary oxidation with bromine suggested by Alsterberg¹². In view of the uncertainties of the chemical methods for determining dissolved oxygen, a need for a simple gasometric reference method has arisen. Gasometric methods hitherto suggested have been rather cumbersome and slow; accordingly the Van Slyke volumetric apparatus has been modified for use with water. A brief preliminary account of the apparatus has been published¹³.

Application of Modern Techniques

Many new analytical techniques have become available during the last few years and many of them may find some use in overcoming analytical problems in the study of pollution.

Absorption spectrometers will no doubt be used to an increasing extent, but at present their use is limited by their cost and lack of portability. Spectrographic analy-

sis has been of very little use for similar reasons, and probably also because such instruments and many others need to be used by specialists if the maximum value is to be obtained from them.

Electrical methods are finding increasing use for detections of end-points of titrations. At the Water Pollution Research Laboratory they have been used in determining residual chlorine by titration with arsenious acid or phenyl arsine oxide, for titrating cyanides, and for the iodine-thio-sulphate titration. Use of polarography is at present limited by the need to spend considerable time in developing appropriate analytical techniques, but may well prove very useful for routine analysis of wastes containing traces of metals.

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Laboratory Service Facilities

A. Gallenkamp and Co. Ltd., 17-29 Sun Street, London, E.C.2, have announced that their sales of electrical apparatus and instruments, including autoclaves, centrifuges, furnaces, hotplates, incubators, ovens, stills, etc., have increased to such an extent that they now provide improved service facilities. Experience has shown that many adjustments and minor repairs can be done in the customers' laboratory by the company's technical service engineer, thus saving time and the inconvenience of returning apparatus to the factory.

Zinc in Foods

Food Standards Committee Report

THE Minister of Food, Major the Rt. Hon. Gwilym Lloyd-George, M.P., has approved for publication a report, which has been presented to the Food Standards Committee by its Metallic Contamination Sub-Committee, recommending limits for zinc in foodstuffs.

The report is in the following terms:—

1. Zinc, like copper, has a definite physiological function in the human organism and is an essential constituent of an enzyme, which is found in red blood corpuscles and which plays an important part in the transport of carbon dioxide by the blood. Zinc occurs in the liver and spleen to the extent of 50 to 140 ppm. and is found in hair, nails, skin and teeth in amounts up to 200 ppm. Small amounts of zinc appear to be necessary for plant growth but larger concentrations are toxic. Soils may contain from 1 to 5 ppm. of zinc and sometimes much more. Sea fish usually have a low zinc content but very high concentrations (over 1,000 ppm.) have been found in oysters.

2. The normal daily intake of an adult has been estimated at 12 mg. and the amount required to balance metabolic loss appears to be of the order of 10 mg.

3. At the other extreme, outbreaks of violent vomiting have occurred from eating food prepared in zinc or galvanised-iron containers and showing a zinc content of the order of 800 ppm. but there are no records of chronic poisoning. The emetic dose of zinc sulphate is shown in the British Pharmacopœia at 600-2,000 mg. but zinc sulphate is rarely, if ever, used for this purpose.

4. The unsuitability of zinc and galvanised iron containers for storing or cooking food is no doubt widely recognised but it may be pertinent to point out that outbreaks of poisoning have been attributed to the inadvertent use of galvanised vessels, for example, to drinking rain water collected from galvanised-iron roofs or stored in galvanised-iron tanks; that acid and saline liquids are particularly corrosive to zinc; and that galvanised-iron vessels should not be used in the preparation of foods or for the storage of moist foods. It should also

be pointed out that if containers made of sheet zinc are used for the storage of food, a film of zinc oxide may form which is easily detached and may contaminate the food.

5. We have been furnished with figures of zinc contamination by Port Medical Authorities, public analysts and food manufacturing firms and we are satisfied that public health requirements would be met by observing limits consistent with efficient commercial practice as follows:—

- (i) Beverages ready-to-drink 5 ppm.
- (ii) Other foods 50 ppm.

For edible gelatin a maximum limit of 100 ppm. zinc has already been prescribed; apart from this and from the reservation in paragraph 6 we do not think it should be necessary to provide limits for zinc contamination in other foods in excess of 50 ppm.

6. In view of the high natural zinc content of certain animal and vegetable products, e.g., herrings, shell-fish, and crustacea, cereal offals and animal offals, etc., we consider that no objection should be taken to the sale of such articles containing zinc in excess of 50 ppm. if it can be shown that the zinc is of natural occurrence.

7. In the absence of any new developments we do not consider that statutory effect need be given to the limits recommended.

The members of the Metallic Contamination Sub-Committee are: Mr. G. G. Barnes (chairman), Professor S. J. Cowell, Dr. J. M. Johnston, Dr. W. P. Kennedy, Dr. G. W. Monier-Williams, Dr. J. R. Nicholls, Dr. G. Roche Lynch, Mr. G. Taylor and Mr. B. W. Smith (secretary).

Chemical Industry Bands

Clayton Aniline Works Band, of Manchester, has entered in the championship class and Monsanto Chemicals Band, of Wrexham, the third section, of the North Western Area Brass Band Championships to be held in the Queens Hall, Preston, on 27 February. The winning and second band at the area contests qualify for the *Daily Herald* National Championships, in London, in October.

Indian Newsletter

FROM OUR OWN CORRESPONDENT

THE technical experts of Krupps and Demag who are setting up the new steel plant in India in cooperation with the Government of India have recommended Roerkela in Orissa State as the best site for the location of the plant. The selected site and three other sites in West Bengal, Bihar and Madhya Pradesh were examined by the firms. The factors which have influenced the final recommendation are economic, since Roerkela is very near the source of the raw materials, iron ore and limestone, and power would be available in plenty from the Hirakud Project, which is expected to be ready before the steel plant goes into operation. Though coal will have to be transported from Bengal, it is felt that it will not be a strain on transport as the wagons which would take iron ore and limestone to the Bengal iron furnaces could be used for hauling coal on their return. The fact that there are already two steel plants in West Bengal seems to have decided the issue of the location of the new plant. The Minister for Production, Government of India, has gone on a visit to the selected site and the Government is expected shortly to make a formal announcement which will confirm the recommendation of the technical experts.

* * *

The Government of Mysore has directed the transfer of the State Government's dichromate factory, near Mysore, to Mysore Chemicals & Fertilisers Ltd. The Government dichromate factory was started in 1940 as a wartime measure to meet the needs of dichromate in textile and leather industries. After 1946-1947, owing to a preference of olive green over khaki for military uniform, the demand gradually fell off, resulting in the working of the dichromate industry at a loss. As the State Government of Mysore feel that there is no possibility of the industry being run without loss, they have decided its amalgamation with Mysore Chemicals & Fertilisers Ltd.

* * *

A pilot plant has been set up for the manufacture of nicotine at the National Chemical Laboratory, Poona. In India

there has been an accumulation of large stocks of low-grade tobacco which could not be sold or utilised. The laboratory last year worked out a process for the extraction of nicotine sulphate from the tobacco waste. The manufacture of nicotine is expected to solve the problem of disposing of the waste tobacco.

* * *

Prospecting operations for gold are being vigorously conducted by the Indian Bureau of Mines in three belts of the zone, between Orissa and West Bengal, where the discovery of the valuable metals, gold and uranium, was made recently. The Director of the Indian Bureau of Mines said that the present investigation was to find out the possibilities of commercial exploitation of the area. In Orissa, the nature of the occurrence of gold revealed a pattern similar to that of the Kolar gold fields, the prime producer of gold in India. Drilling operations and quantitative assessments were under way to establish the rich payloads in the 42-mile extent of occurrence. The Deputy Minister for Natural Resources and Scientific Research of the Government of India made an on-the-spot study and recommended intensifying the operations.

* * *

A deposit of white sand suitable for testing cement has been discovered in the Chingleput district of Madras State. Twenty-six test pits, going down to the level of ground water, put down to ascertain the extent of the deposit, show that about 60,000 tons of sand of the required fineness are estimated to be available. In the United Kingdom, the Leighton Buzzard sand, which meets quality requirements, is used as the standard. Investigation by the Geological Survey of India and the Indian Standard Institution reveals that the sand from the new deposit may be used as a standard for the testing of cement.

* * *

According to the Geological Survey of India, reserves of refractory clay estimated at 367,000 tons are available in the 250 square mile Kobra coal field area of Bilaspur district, Madhya Pradesh. The clays are mostly fine-grained and light to buff grey in

colour. Preliminary physical tests carried out at the Central Glass and Ceramic Research Institute, Calcutta, showed that most of them have good plasticity.

The Indian Standards Institution has issued revised Standards for moderate and high-heat duty fireclay refractories designed as Group 'A' and Group 'B'. These standards were first issued in 1949 and in the light of experience it has been found possible to make some of the provisions more stringent. It is expected that the revised standards would help in the supply of higher quality refractories.

The National Research Development Corporation established by the Government of India (see *THE CHEMICAL AGE*, 1953, 69, 361), for exploiting the inventions and patents of the national laboratories and research institutions of the country, has now been registered in New Delhi. The inventions will be assigned in the first instance to the Corporation, who will negotiate with industries for their exploitation. If any industrial concern bears the cost of setting up pilot plants or the cost of pilot plant trials, it will be permitted the use of the results of research free of any royalty for a fixed period. The authorised capital of the Corporation is Rs.10,000,000 (£750,000) and the subscribed capital Rs.1,000,000 (£75,000). The Government will provide long-term loans if necessary. The Corporation sought information from institutions and it is learnt that 103 processes are now under examination. In this connection, it may be pertinent to point out that leading industrialists of India met recently to effect better representation of industrial interests and to focus attention on the vital role free enterprise could play in the economic development of India.

The managing director of the Parker Pen Company Limited, London (Mr. Norman Byford), has announced that a factory would soon be opened in Madras for the manufacture of 'Quink' and writing instruments. There is also another move by a different British firm to set up a fountain pen ink factory at Bangalore.

At a meeting of the Royal Institute of Chemistry, Madras Branch, Prof. Schlittler of Basle University (now with Ciba Pharmaceuticals, USA) described the isolation by

himself and colleagues of reserpin, a new alkaloid from an Indian plant, which is highly useful in medicine, to cure high blood pressure. The manufacture of the crystalline chemical is receiving the attention of the Government of India.

Dangerous Goods by Road

THE Working Party set up by the Economic Commission for Europe to draft a European Agreement concerning the international transport of dangerous goods by road, along the lines of that covering transport of such goods by rail, met recently. It came to the conclusion that it would have to bring its work into line with what it was proposed to do at the world level in preparation for an international agreement on the classification, labelling, packing and presumably packaging of dangerous goods. The European agreement in respect of road traffic will not be put into final shape until the outcome of that work is known.

Dangerous goods include explosive, inflammable solids and liquids, corrosive liquids, poisons and radio-active substances.

The first of two addenda to the proposed agreement, which are still being studied by the Working Party, concerns consignors of dangerous goods and deals with the classification of goods and the methods of packing and labelling them according to the class to which they belong. The second concerns carriers and covers such matters as the construction of vehicles, any special forms of equipment required, loading and unloading of vehicles, marks and signs, road speeds and other safety rules to be observed by vehicles.

Oil Search in Egypt

THE Conorada Petroleum Corporation of America is reported from Cairo to be contemplating large-scale exploration for oil in Egypt. The company has signed a 30 years' renewable lease with the Egyptian Government for prospecting in an area of 185,000 square kilometres in the Western Desert.

The Minister of Commerce and Industry, Dr. Badawy, stated that the company has already deposited \$100,000,000 with the National Bank of Egypt as a guarantee for the first year's work. The premier, General Neguib, said other offers of foreign capital were under consideration.

Tanning Materials

OEEC Chemical Products Committee Report

A STEADY increase in the production of both of vegetable tanning extracts and vegetable tanning materials during the period 1948-1952 is shown in a report of the Chemical Products Committee of the Organisation for European Economic Co-operation, based on replies to a questionnaire sent to all member countries.

The following table shows the development of production of vegetable tanning extracts and materials from 1948-49 (average of the two years) to 1952:

	In metric tons of pure tannin (Shake method)	
	Tanning extracts	Tanning materials
1948-49	64,684	16,910
1950	65,803	20,672
1951	70,652	20,960
1952	77,109	20,164

Production of the main types of tanning materials produced in member countries in the years 1950-1952 shows varying trends:

	In metric tons of pure tannin (Shake method)		
	1950	1951	1952
Oak chestnut	59,314	64,335	71,452
Valonia	18,146	17,705	17,516
Sumach	1,131	1,090	1,072

While imports of vegetable tanning materials in general fell by 43 per cent in 1952 compared with 1951, the fall in imports from member countries was greater (53 per cent) than the fall in imports from non-member countries (38 per cent). Consequently, imports of the materials principally supplied by member countries (oak, chestnut, valonia) showed a greater decline than the average (50 per cent for oak and chestnut and 71 per cent for valonia). In addition, the import of these same materials from non-member countries even increased in certain instances.

Exports of vegetable tanning materials in 1952 were 11 per cent higher than in 1950, although about 11 per cent lower than in 1951. Whereas, however, exports of valonia and 'other tanning materials' fell considerably, exports of oak and chestnut extracts showed a large increase (70 per cent between 1950 and 1952). This increase was, however, solely due to an exceptional expansion of the export of these two extracts to the USA.

There was a marked increase in the tonnage of tanning materials available for home consumption between 1948-49 and 1950, and the quantity available in 1951 was even slightly higher. In 1952, however, the tonnage available for the home market decreased by more than 25 per cent, mainly due to the considerable fall in imports. The tonnages involved are shown in the following table:

1948-49 ..	152,502 tons of pure tannin (Shake method)
1950 ..	160,071
1951 ..	170,122
1952 ..	124,954

With regard to synthetic tanning materials, the position in 1950, 1951 and 1952 for all member countries except Ireland and Iceland (figures for Ireland are not available and Iceland consumes no synthetic tanning materials) can be summarised as follows:

	Metric tons (Filter method) Available for domestic consumption			
	Production	Imports	Exports	
1950 ..	13,824	1,035	1,789	13,070
1951 ..	15,869	1,326	3,179	14,016
1952 ..	13,432	1,306	3,127	11,611

There was a fall of 3 per cent in production in 1952 and 11 per cent in the quantities available for home consumption compared with 1950. Exports on the other hand nearly doubled during the three years period. Deliveries to other member countries have increased to a lesser extent than shipments, principally by Germany and the United Kingdom, to non-member countries.

Micro Techniques Course

COMMENCING 24 April, a course of 12 lectures and appropriate practical work on micro and semi-micro techniques in chemistry will be held on Saturday mornings from 9.15 a.m. to 12.30 p.m. at Norwood Technical College, Knight's Hill, London, S.E.27. Lectures, illustrated by demonstrations, will deal with organic preparative techniques and qualitative analysis, the design and construction of apparatus, and simple chemical microscopy.

The fee for the course is £1 2s. 6d. Application for admission should be made to the secretary of the College.

Dewatering Problems

Further Uses for the Russell Separator

MANY attempts have been made to devise mechanical means for the separation of crushed ore from the large quantities of water employed in many mining operations. Various types of vibrating screens have been tried, sometimes assisted by pressure feed or vacuum take off, but for general application none of these has proved entirely successful.

A new approach to this problem has been made possible by the advent of the Russell Separator. In this machine the separation is brought about by passing the material through a fine wire mesh, but the novelty of the device lies in the unique application of controlled gyratory motion to the screen surface. The machine is of quite modest dimensions, the screening area amounting to only $6\frac{1}{2}$ sq. ft., but the throughput is phenomenal, amounting in some cases to 20,000 gallons per hour through a 100 mesh. (See THE CHEMICAL AGE, 1953, 69, 1273.)

Controlled Gyratory Motion

It should be remembered that, used in this sense, 'controlled gyratory motion' implies that the screen surface is impelled to move in such a manner that while not itself rotating, each point upon its surface shall be describing a circle of small diameter (in this case about $\frac{3}{16}$ in.) in a horizontal plane operating at about 1,500 gyrations per minute.

The unit will operate effectively with meshes up to 200 per linear inch (6,200 apertures per sq. cm.). For the treatment of liquids carrying a high percentage of solids in suspension, a mechanical brush gear is available capable of dealing with two tons (2,000 kg.) of reject material per hour.

The unit is powered by a $\frac{3}{4}$ HP electric motor of special waterproof design and is economical to operate. The overall dimensions of the machine are:—

length—5 ft. 7 in. (170 cm.), height—3 ft. 2 in. (96 cm.), width—35 in. (84 cm.), with a weight of $10\frac{1}{2}$ cwt. (530 kg.).

The mesh frames measure 61 in. (155 cm.) by 20 $\frac{1}{2}$ in. (52 cm.) and these are readily detachable for cleaning or exchange purposes. It will be appreciated that this machine has a vast field of application in

the numerous dewatering processes ancillary to mining operations. Under the aegis of the National Coal Board, separators are being set up in collieries for regaining the coal dust contained in water emanating from coal washing plants.

The material that can be thus regained has a value of 30s. to 60s. per ton, and in quantity may amount to 50 tons per day from the average pit working. A single separator machine operating with an 80 stainless steel mesh (1,000 apertures per sq. cm.) can deal with $1\frac{1}{2}$ tons (1,250 kg.) of extracted coal dust per hour.

Another application of the Russell Separator which, though not directly connected with mining operations, is of some interest and importance, is to be found in the processing of tar, the principal by-product which emanates from coke-oven operation.

Tar thus produced always contains a large quantity of foreign matter in the form of free carbon and usually also a considerable amount of water and in this state has little commercial value.

The purification of this tar has always constituted a very expensive, laborious and sometimes even impractical problem. However, the separator with its unique straining propensities has provided a complete solution of this difficulty.

Working with a 100 mesh screen, the separator can deal with outputs up to 3,000 gal. (13,500 l.) per hour, separating out the solid material, and incidentally partially breaking down the emulsions, so that the tar thus processed can be readily dewatered by continuous centrifuging.

Removing Fumes

MATHIESON Chemical Corporation announced recently that construction had begun on a combination fume scrubber and burner installation at its Pasadena fertiliser plant. This installation culminates many months of research and experimentation in Mathieson's efforts to find a satisfactory solution for removing odours arising from its fertiliser manufacturing operation. During their research efforts, Mathieson engineers discovered certain masking agents which improved the control of odours at the plant; however, they did not feel that this was a complete and satisfactory solution to the problem.

Oil Modified Rubbers

Petroleum Fractions in Natural & Synthetic Polymers

IN recent years oil modified rubbers have gained increasing importance, particularly because, as extenders for natural and synthetic rubbers, they impart very desirable characteristics to the latter products. For example, by mixing synthetic rubbers with mineral oils, the abrasion resistance is vastly improved, a factor of the utmost importance in the manufacture of tyres. The chemical composition of the oil is of course of prime importance, and in facilitating the processing of rubber, where the oil functions as a plasticiser, Rowzee utilised low molecular weight oils (*Rev. Gén. Caout.*, 1952, **29**, 123).

Nitrogen Bases & Paraffins

In other applications, the hysteresis properties of sodium catalysed rubbers have been improved by the incorporation of rubber processing oils. Blends of nitrogen bases and acid paraffins are claimed to be the most useful compositions for plasticising rubber, where the presence of nitrogen bases, usually 15 to 30 per cent, produces a flatly vulcanised curve. The acid paraffins are responsible for tack and improved processing characteristics.

Petroleum oils are roughly classified as paraffinic, naphthenic and aromatic, the best processing oils being prepared from fractions of high aromaticity—the fractions of low aromaticity tending to give compositions having superior hysteresis properties (*W. L. Dunkel, Rubber Age (N.Y.)*, 1953, **128**, 215). Again, polymers extended with aromatic cuts with high content of nitrogen bases are shown to be more resistant to high temperature gelation than samples extended with oils of low aromatic content. Solvation of the rubber macro-molecules will be greater for aromatic type oils than for paraffinic-type oils; this would infer a possible reduction in cross-linkages, characterised by improved processing properties. This reduction in crosslinkage may also, however, account for the tendency of such samples to show crack formation.

In order to reduce the toughness of polymers produced from butadiene and butadiene-styrene mixtures, oils are sometimes incorporated as plasticisers, being usually

added to the swollen mass before drying. By this method the products become more tractable. Such copolymers, however, take up appreciable quantities of oil before pronounced differences in plasticity are observed (*Stewart and Williams, Ind. Eng. Chem.*, 1953, **45**, 173).

In such polymerisations, using Alfin catalysts and yielding copolymers having minimum cross-linking, oil processing gives elastomers technically superior and competitive with natural rubber. The addition of oil to the polymerising medium assures a very uniform product, although its addition decreases the efficiency of the catalyst. The oils in common use for such processes are sold under the following trade names—Circosol, Sundex 53, Shell SPX-97, Dutrex 20 and Califlux TT. Processing may be further enhanced by the use of peptisers such as RPA No. 3, a Du Pont product.

The accurate dispersal of fillers in rubber may again be accomplished by the use of nitrated polycyclic petroleum hydrocarbons, obtained by a selective extraction process using furfuryl alcohol. Utilising such a method, improved flexing characteristics are imparted to vulcanisates. By a similar process, PVC may be incorporated successfully into rubber compositions (*BP*, 686,875).

In conclusion, natural rubber can be worked without the necessity of previous mastication by the immersion of rubber sheets in petroleum oils (fraction boiling at 250-350°) for 15 minutes, the operation being concluded by drying for one hour. (*FP*, 972,408). The elongation of Neoprene grades is also improved by oil, this being achieved without any undue deterioration in the other physical properties. Such lighter fractions as those embodying the kerosene range have been copolymerised with rubber, using trioxymethylene (*Rev. Gén. Caout.*, 1952, **29**, 616).

Canada's Petrol Consumption

Addressing Montreal District Chambre de Commerce, Mr. F. Van den Broeck, a director of Petrofina Ltd., stated that Canadian consumption of petroleum products is among the highest in the world.

Control of Red Spider Mite

SINCE 1944 the Pettar Society of Winter Wash Manufacturers, the Associated Fruit Growers of Essex Ltd. (Ace Growers) and the Agricultural Research Council have jointly organised and financed investigations into the commercial control of the fruit tree red spider mite. Ace Growers and the Essex Institute of Agriculture have provided plantations for experiment, labour and machinery; the Pettar Society have furnished chemical materials, some scientific and the recording staff; and the Council have provided (through East Malling Research Station) scientific staff and laboratory facilities. The work has been planned and co-ordinated by a joint conference of the three organisations.

The first stage of the investigations was devoted to the trial of winter washes, but these by themselves were found not to give a sufficient degree of control. Since 1949 the investigations have been concentrated on the use of summer acaricides and ovicides, including derris, parathion, diphenyl sulphone (DPS), chlorophenyl benzene-sulphonate (CPBS) and chlorophenyl chlorobenzenesulphonate (CPCBS). It has been found possible to obtain effective control of the red spider mite by a single application of DPS, CPBS, or CPCBS as an ovicide when applied with a suitable acaricide. By observing proper precautions, with due regard to variety, spray damage to trees and fruit can be eliminated or reduced to a minimum.

In view of the success which has been attained it has been decided that it is not necessary to pursue the collaborative investigations further. Arrangements will be made by the Agricultural Research Council for publication of a full account of the work.

Atomic Energy Information

AS a result of recommendations made last year by the 6th Tripartite Declassification Conference, held in Canada, amendments have been made to the Declassification Guide used to decide what atomic energy information may be published and what must remain secret.

It was agreed that while information of critical importance for the design or operation of reactors for plutonium production or military purposes must still be kept

secret, information required for studies of the economics of power producing reactors should as far as possible be released.

All work in production establishments, such as the Windscale and Capenhurst works, has hitherto been treated as classified, but it has been agreed that many of the less important details and processes can now be released, while maintaining secret the production technology of substances of critical importance to the project.


As a result of previous conferences, values for the thermal neutron cross sections of U^{235} , U^{238} , natural uranium and plutonium 239 were released. The cross sections may now be published in the ordinary way, together with experimental details of the method of measurement.

Much of the basic chemistry of plutonium has already been declassified. Now some of the physical properties related to the metallurgy of pure plutonium can also be released. Basic chemical studies involving the use of ion exchange resins for all elements except plutonium can be released, as can basic studies on the chemical kinetics of fluoride corrosion.

Non-Ferrous Metals Market

THE latest raw materials situation report for 1953 of the Non-Ferrous Metals Committee of the Organisation for European Economic Co-operation states that the market in non-ferrous metals is returning to a more 'normal' state, where production and consumption are coming into balance. The buyers' market, which, in 1952, followed the post-Korean sellers' market, continued into 1953. Nickel is still an exception; although the situation has eased, it cannot yet be interpreted as satisfactory for any European country.

Compared with 1952, fluctuations both in production and consumption in 1953 were not considerable except in the case of aluminium, which shows a marked increase of production in continuation of past trends. The drop in prices during 1952 and early 1953 did not stimulate demand. Abstinence from buying, characteristic for a period of dropping prices, brought about a decrease in apparent consumption. On the other hand, it was noted that the relative stability of prices which became apparent in the second quarter of 1953 stimulated demand.



The Chemist's Bookshelf

AN ADVANCED TREATISE ON PHYSICAL CHEMISTRY. Volume IV—Physicochemical Optics. By J. R. Partington. Longmans, Green & Co. Ltd., London. 1953. Pp. 688. 80s.

Readers of earlier volumes of Professor Partington's massive treatise will not be disappointed by this latest volume on optics. Nor indeed will they be surprised by the author's encyclopædic approach to a subject which is fundamental to so many branches of modern physical chemistry.

Volume IV covers a wide range of topics of interest to physicists and physical chemists and indeed to scientists in any field, who employ or wish to employ optical techniques. The book is divided into six sections with the following headings: Refraction of Light, Polarisation of Light, Optical Activity, Electromagnetic Theory of Light, Magnetic Rotation and Piezoelectricity and Pyroelectricity. There are unexpected omissions. Fluorescence is not dealt with in detail, while the treatment of molecular and Raman spectra is postponed to a later volume stated to be already in the press.

To the chemist the most valuable sections are undoubtedly those on polarised light and optical activity. Throughout these sections the author shows a lively appreciation of the difficulties encountered by students and the many valuable diagrams contribute much to ease of understanding. Justifiably, Professor Partington makes no attempt to cover fully the enormous field of stereochemical organic chemistry. The section on the electromagnetic theory of light is particularly well done, the historical approach being especially suited to the less technically equipped reader. Although brief in comparison, the final section on piezoelectricity and pyroelectricity covers all important sections of these subjects and is the more valuable since these topics are so seldom dealt with fully in textbooks of physics.

Nowhere is the author blinded by modern science. As in all the earlier volumes, Professor Partington insists on due credit being given to those who laid the foundations of the subject. The reader feels that the author joins with Maxwell when he quotes the great master as saying:

'And even in science it is when we take some interest in the great discoverers and their lives that it becomes endurable, and only when we begin to trace the development of ideas that it becomes fascinating.'

There is, as usual, a mathematical appendix and no less than 10,718 separate references to the original literature.—R. C. PINK.

EXPERIMENTS, THEORY, AND PROBLEMS IN GENERAL CHEMISTRY. By H. W. Stone and J. D. McCullough. McGraw-Hill Book Co. Inc., New York & London. 1953. Pp. 352. 48s.

The problem of constructing a satisfactory introductory course for first-year chemistry students is one which has troubled generations of lecturers and, if one may judge by the frequency with which fresh introductory manuals are published, continues to do so. The historical approach has always been attractive as it lends a certain form to the course, but it involves the discussion of laws and problems which are now only of secondary importance and is being relinquished in favour of more logical expositions. The present volume is an attempt to integrate the elementary theory of chemistry with the practical work carried out in the laboratory. The course is intended to be carried out by first-year college students in the United States, but it is doubtful whether it would fit comfortably into the syllabus of schools or colleges in this country. Nevertheless, the book could be of the greatest value to the lecturer and demonstrator who could modify it to suit the particular needs of his students.

The book does not constitute a complete course but is intended to be supplemented by

lectures and also by other textbooks which the student is invited to consult. In this way it differs from any other elementary manuals which attempt to include all the relevant information.

The experimental work which has been included has been selected very carefully so that the student is never required to carry out a series of operations with the result of which he is already familiar, for as the authors rightly point out, this type of experiment is dull and leads to apathy and carelessness.

The book is in the form of a ring-backed loose leaf folder with stout paper covers; the individual leaves are perforated for easy removal and, for no apparent reason, are punched with two sets of holes.

The material is divided into eight sections, the first being introductory in nature, and each section has three sub-sections. The first sub-section deals with the specific assignment which illustrates a particular concept in general chemistry and contains practical work, reports and problems. The second sub-section gives the theory of the concept, while the third contains problems which require the application of the concept in an intelligent or non-mechanical fashion. To take a concrete example, Section V, which deals with the concentration of solutions, volumetric analysis and acids, bases and salts, has six separate assignments. One of these assignments is the determination of the equivalent weight of an unknown solid acid; the text gives the experimental details and then there is a report form which the student is required to fill in with his experimental results. The name of the acid is then revealed to him and he is required to add the formula and molecular weight. Other acids and bases are listed and the molecular and equivalent weights must be filled in. Finally, there is a simple problem on the determination of an equivalent weight. It is a debatable point as to whether the student will acquire neatness and accuracy by presenting his results in this fashion. The method is neat and systematic when applied to routine industrial analysis, but seems rather mechanical as a teaching aid, however much it may simplify the work of the lecturer. The bewilderment of a form filling student might be considerable, when at a later stage of his development, he is required to present his results without the indications as to method

and layout which was suggested by the form.

Section V contains a short theoretical explanation which needs considerable amplification by the student and a set of no less than 61 problems of varying grades.

This plan is carried out in all the sections and the progress of the student is to be checked by examinations held during the course. Representative specimen papers are included in the appendices at the end of the book.

A great deal of thought has gone into the construction of this course and the treatment of each subject is everywhere admirable, and it can be recommended to all those engaged in the teaching of general chemistry.

On the other hand, the price seems to be high for a book with such flimsy binding and containing so many blank pages.—J.R.M.

DIE FESTE KOHLENSAURE. By J. Kupriano. Second revised and extended edition. Ferdinand Enke Verlag, Stuttgart. 1953. Pp. 125, 33 illustrations, 19 tables. Paper cover, DM. 18.

The use of solid carbon dioxide has increased steadily since the publication of the first edition of this monograph in 1938, and this makes the appearance of a new edition, incorporating the many advances made in intervening years, very welcome. The book deals with all aspects of the production and use of solid carbon dioxide. It gives an excellent survey of the methods used for the preparation of the gas and its conversion to the solid. The problems associated with the transport and storage of the solid are discussed in detail. There is also a full account of the applications of carbon dioxide as a refrigerant—this chapter includes an interesting section of the effect of the gas on meat, vegetables, fish, etc. Much useful thermal data, including a temperature-entropy diagram, is also given. The final chapter deals with the economics of the subject.

This is an excellent and authoritative book giving many references to the literature and a list of patents. Unfortunately the price is rather high—it should be possible to produce a paper covered monograph of this size more cheaply. The book is one of the 'Sammlung chemischer und chemisch-technischer Vorträge'; the price for subscribers to this series is DM. 16.40.—J.C.P.S.

Agricultural Chemicals

Good Progress in Australia

AUSTRALIA will soon be largely self-sufficient in agricultural chemicals, according to a new year review issued by Mr. Thomas Conroy, Assistant Controller of the Chemical Group of Imperial Chemical Industries of Australia and New Zealand Ltd.

He adds that progress in the manufacture and development of agricultural chemicals in Australia took a long step forward last year. The demand for such chemicals has greatly increased, as the farmer, who now understands and appreciates the value of insecticides, fungicides, weed-killers and animal medicines, applies them more effectively.

During 1953 the greatest development was in the field of fungicides, and, because it was a year of heavy fungus infestations, the new discoveries came at the right time. Most outstanding was the development of Thiotox, used in combating black spot in pome fruits.

Valuable work has also been done with insecticides for the control of red spider and red mite, and the new sprays and baits have been particularly useful against the grasshopper outbreaks in parts of New South Wales.

Mr. Conroy says that one of the biggest agricultural developments of 1954 can be expected in Queensland. Test aerial spraying of the pest, brigalow scrub, with hormone weed-killers is giving excellent results. About 16,000,000 acres of high-class land are infested with brigalow in the mid-west of Queensland, and the clearing of it would open up tremendous agricultural possibilities.

Food Industry Engineering

THE Chemical Engineering and Food Groups of the Society of Chemical Industry are combining in a conference on 'Chemical Engineering in the Food Industry,' which will be held at the Wellcome Research Institution, 183 Euston Road, London, N.W.1, on 18 and 19 March.

At the morning session on the first day, under the chairmanship of Dr. J. H. Bushill, chairman of the Food Group, the opening address will be given by Sir Ben Lockspeiser, and three papers will be presented

and discussed. Professor A. W. Scott will preside at the afternoon session, when four papers will be presented.

For the morning session on the second day, the chair will be taken by Professor F. H. Garner, chairman of the Chemical Engineering Group, and two papers will be presented. The chairman for the afternoon session will be Dr. Franklin Kidd. Three papers will be presented at this session and there will be a closing address by Mr. H. W. Cremer. In the evening an informal dinner will be held at the Trocadero Restaurant, Piccadilly Circus.

The conference will be open to non-members, as well as members, the registration fee for the former being £2 2s. Further particulars are obtainable from the Assistant Secretary, Society of Chemical Industry, 56 Victoria Street, London, S.W.1.

More Oil Found

OIL has been revealed in commercial quantities at a depth of 3,029 ft. in carboniferous limestone at Plungar, near Nottingham, after tests at well No. 2 there by the D'Arcy Exploration Company, the Anglo-Iranian company's prospecting subsidiary. The extent of production is not yet known.

A drilling rig is being erected at the site of well No. 3, which is 1,000 ft. away from well No. 2. Other wells are being located to investigate the extent of the producing area. Oil was found at Plungar last autumn at a depth of about 2,800 ft.

During 1953 production from Anglo-Iranian's oilfields centred on Eakring, Nottinghamshire, and Formby, Lancashire, totalled 54,600 tons. Since 1938 these fields have yielded 802,000 tons of crude oil. The oil is taken by rail to the company's refinery at Pumphreston, Midlothian.

Indian Fertiliser Trials

Under a supplementary agreement to the programme of American aid to India, recently signed, India is to import 5,000 long tons each of urea and ammonium sulphate nitrate for the purpose of demonstrating and popularising such fertilisers. The cost—\$1,150,000—will be met by the US Government.

HOME

£1,000,000 for Nylon Spinning

It has been announced that British Nylon Spinners Ltd., Pontypool, a joint subsidiary of Courtaulds Ltd. and Imperial Chemical Industries Ltd., intends spending more than £1,000,000 on equipping the factory which it acquired at Doncaster for nylon spinning. Production will begin next year and ultimately 1,500 men will be employed. The factory was formerly used for artificial silk production by British Bemberg Ltd., which went into voluntary liquidation last year.

Cosmetic Chemists' Golf

The annual golf meeting of the Society of Cosmetic Chemists has been fixed for Wednesday, 19 May, and will be held at Walton Heath Golf Club. The competition is open to all members of the toilet and cosmetic industry and to members of firms who are actually suppliers of materials for the industry.

Sugar-Coated Penicillin Tablets

The introduction of Praducil, the first sugar-coated penicillin oral tablets, was announced this week by Evans Medical Supplies Ltd. These tablets are the first to be made by the 'Prescoted' method described in *THE CHEMICAL AGE* on 13 February (p. 428). Hitherto it has not been possible to sugar-coat penicillin tablets since the conventional 'pan' coating method requires the presence of moisture, which would destroy the activity of penicillin.

Dyeworks Offered for Sale

The Lady Royd Dyeing Co. Ltd., Allerton Road, Bradford, was offered for sale by auction last week as 'a going concern' with plant, but was withdrawn at £2,600.

Steel & Pig Iron Production

The Iron & Steel Board state that UK steel production in January averaged 360,300 tons a week, which is the highest January figure ever recorded. In January last year the weekly average was 346,300 tons. Pig iron production in January this year average 229,600 tons a week, which was a record.

New Coke Oven Plant

The building of a new coke oven plant at the Cleveland works of Dorman Long and Co., Ltd., will result in the company's output of crude benzole and crude tar being nearly doubled. The tar and benzole will be sent to the central refining plant at Port Clarence, where new plant is being built for the separation of the raw materials into a wide range of benzole and tar compounds.

I.C.I. Ties on Sale Soon

In the February issue of *I.C.I. Magazine* it is announced that the I.C.I. tie will have a design of yellow lines on a maroon ground, with white wavy stripes (see *THE CHEMICAL AGE*, 1953, 69, 1315). The first ties will be on sale in April and they will be made in Terylene, but experiments now being carried out may make it possible to weave subsequent quantities in a blend of Terylene and Ardil. Both of these synthetic fibres are I.C.I. patented.

Record Gas Supplies

All British records in gas supply were broken in meeting the demand created by the recent cold spell. During the first week in February the Gas Boards supplied 15,710,000,000 cu. ft. This beats the previous week's figure of 14,850,000,000 cu. ft. which was itself a record. It is 30 per cent higher than the 1949 peak, before nationalisation of the industry.

The Science of Clothing

The Society for Visiting Scientists Ltd. will discuss 'The Science of Clothing' at a meeting on 2 March at 7.30 p.m. In the chair will be Professor A. V. Hill, and the speakers will be Dr. O. G. Edholm, Head of the Division of Human Physiology, National Institute for Medical Research, R. W. Moncrieff, consultant, and Dr. E. T. Redburn, Superintendent of Clothing and Equipment Physiological Research Establishment, Ministry of Supply. Dinner will be provided in the Society's dining room at 5 Old Burlington Street, at 6.15 p.m. Those intending to take dinner are asked to inform the assistant secretary.

OVERSEAS

Dutch Company to Manufacture 'Terylene'

Imperial Chemical Industries Ltd. have concluded a licence agreement with Algemene Kunstzijde Unie NV, Velperweg 76, Arnhem, the Dutch manufacturers of rayon and nylon, under which the latter company will have the right to manufacture in the Netherlands and Belgium the polyester fibre 'Terylene.'

Pakistan's Improved Chromite

A recent issue of *Pakistan News* (an official publication) claims that chromite mined in Pakistan has shown an upward trend in quality and that it now ranks as the world's second best in metal content. It is sold in international markets in its crude form at a profit of Rs. 86 a ton. The market price for pure metal is quoted at about Rs. 7,000 a ton. Production has increased to more than 23,400 tons a year.

Vat Dyestuffs for Poland

The Boruta works in Zgierz (Lodz Voivodship), Poland, has recently started the production of vat dyestuffs. All design, research work and plant construction was carried out by Polish workers.

Sulphur Agreement Rejected

A proposed 50 years equal profit-sharing agreement between the Texas Gulf Sulphur Co. and the Iraq Government, for sulphur exploitation in Iraq territory north of the 33rd parallel, has been rejected by the Iraq Council of Ministers. Announcing this, the Acting Minister of Economics, Mr. Kamuna, said he asked for four amendments but the company refused to consider them.

'Rust & Rot' Exhibition

An international 'Rust and Rot' Exhibition is to be held in Oslo from 11-20 June by the Study Society for Norwegian Industry together with the Norwegian Wood Technology Institute. The corrosion of metals in Norway is computed to cost the country about £15,000,000 a year and the exhibition will show as comprehensively as possible how the menace of wood and metal decay can be overcome.

Atomic Pile for Holland

It was learned in Oslo last week that the joint Netherlands-Norwegian Institute for atomic research is planning to construct a 25,000 kW atomic pile with a stock of 10 tons of uranium, at a cost of 16,000,000 guilders. The pile will probably be situated in Holland.

Nearly 700 Papers

Important improvements in jet engine fuel, developments in synthetic detergents and chemical advances will be reported at the 125th national meeting of the American Chemical Society at Kansas City, Missouri, opening on 24 March. Research achievements in petroleum chemistry and new techniques in teaching chemistry are among the many subjects to be discussed by 5,000 chemists and chemical engineers in some 697 papers.

Oil Refining on the Continent

Oil processed last year at the six Continental refineries operated by Anglo-Iranian and its associates increased by over 500,000 tons. The provisional total for 1953 is 8,000,000 tons, compared with 7,495,000 tons in 1952. All six refineries—two in France, two in Germany, and one each in Belgium and Italy—contributed to the increase. The highest throughput last year was at Lavera Refinery, near Marseilles—operated by Anglo-Iranian's French associate, Société Generale des Huiles de Huiles de Petrole BP—where 2,210,000 tons of oil were processed.

Colloquium on Spectroscopy

The Spectrochemistry and Colorimetry Group of the Austrian Chemical Association will hold its fifth colloquium in Gmunden from 30 August to 3 September. The colloquium will be divided into two parts: absorption spectroscopy in the examination of technical artificial fibres, and emission spectroscopy of non-conductors and alloys of copper. Interested organisations should write before the end of March to Arbeitsgruppe für Spektrochemie und Kolorimetrie im VOCh, Wien IX, Sensengasse 2.

• PERSONAL •

The Council of the Association of British Chemical Manufacturers gave a complimentary dinner on Wednesday, 10 February, to C. G. HAYMAN, Kt., chairman of the Association from 1950-1953, in celebration of the honour of Knight Bachelor accorded to him in the New Year Honours List.

A. Boake, Roberts & Co. Ltd., announced this week that consequent upon the death of Mr. H. G. BUCK, director and secretary, the board has appointed Mr. D. M. JAMBLIN secretary of both A. Boake, Roberts & Co. Ltd., and A. Boake, Roberts & Co. (Holding) Ltd., with immediate effect.

Mr. R. E. F. DE TRAFFORD has been appointed chairman of Manchester Oil Refinery (Holdings) Ltd., in succession to Mr. H. S. EBBEN, who resigned last July because of ill-health. Mr. de Trafford is chairman of Philip Hill, Higginson & Co. Ltd., bankers; Atlas Assurance Co. Ltd.; Elliott Brothers (London) Ltd.; and General & Commercial Investment Trust.

Mr. ARTHUR COX and Mr. M. W. NOLAN have been elected directors of Cement Ltd. SIR JOHN KEANE and Mr. R. NESBITT KELLER, who recently retired from the board by rotation, did not seek re-election at the annual meeting.

Mr. E. D. W. KIDD, Weymede, High Road, Byfleet, Surrey, announces that he is now available for consultation on problems connected with the crushing, grinding, chipping, shredding, mixing and drying of most types of raw materials used in industry. He specialises in advising on the best type of plant to use for particular problems.

Mr. J. BRESS has joined the Product Development Department of the Chemical Division of Celanese Corporation of America as technical service engineer. He is attached to the Application Laboratory of the Division at Summit, New Jersey, and will work with vinyl acetate emulsion paint formulations.

Mr. J. BISHOP, general manager of Robert Dempster & Sons Ltd., Elland, Yorkshire, has been appointed general manager of Nordac Ltd., Uxbridge, as from 1 March. He was formerly with Newton Chambers & Co. Ltd., Sheffield.

Mr. J. N. DEAN has been appointed deputy chairman of the Telegraph Construction & Maintenance Co. Ltd. The executive duties of the board will no longer be vested in a managing director, but will be carried out by a managing board, of which Mr. Dean, as chief executive, will be chairman.

Obituary

The death has occurred at the age of 66 of Mr. LITTLEWOOD HOYLE, a director of Wright Hinchliffe & Co. Ltd., Valley Dye Works, Holmfirth, Yorkshire. Mr. Hoyle took a prominent part in local affairs.

Resignation of Directors

ASKED in the House of Commons last week why the Iron & Steel Holding & Realisation Agency had pressed for the dismissal of three directors of the Staveley Iron & Chemical Co., Ltd., the Financial Secretary to the Treasury, Mr. John Boyd-Carpenter, said the question referred to day-to-day management, which would be for the Agency and about which the Treasury would not normally be informed. He understood, however, that in this case the resignations were tendered on the initiative of the three directors concerned, and that their retirement from the board of the company was at their own definite wish.

When Mr. George Strauss (former Minister of Supply) asked whether there had not been any dispute or quarrel about the selling of the shares which had prompted the resignation of these directors, Mr. Boyd-Carpenter replied that that was a totally different question.

Publications & Announcements

OF recent years Monsanto Chemicals Ltd. has increased the scope of its service to industry with the progressive addition of new product groups, including chemicals for the textile industry, new and powerful adhesives, industrial preservatives, chemicals for the farmer, the lubricating oil manufacturer, etc., at the same time strengthening continuously its supply of basic materials. A list of Monsanto products, arranged alphabetically for ready reference, is contained in the new edition of 'Monsanto Chemicals & Plastics.' General information concerning each product is given in abridged form. Copies of this list, which replaces that published in 1952, are obtainable on application to the company at 25/27 Charles II Street, London, S.W.1.

* * *

IN many cases the use of Geiger-Müller counters in nucleonics is being replaced by the more versatile scintillation counter. The basis of this unit is a suitable scintillation phosphor and to be satisfactory, such phosphors must be made from the purest constituents, and be properly mounted. In addition, they must be easy to handle, obtainable in large bulk where necessary, and easily fabricated to complex shapes. Isotope Developments Ltd., Finsbury Pavement House, 120 Moorgate, London, E.C.2, are marketing a range of crystalline and plastic phosphors suitable for the counting of alpha, beta and gamma rays, neutrons, protons, and X-rays. Those supplied include a ready-for-use sealed capsule containing a thallium-activated sodium iodide crystal; an extremely pure plastic phosphor, tetraphenyl butadiene in polystyrene, with good response and optical characteristics; and zinc sulphide in Perspex for fast neutron counting. Technical details of the whole range are obtainable from the company on request.

* * *

AN adaptable piece of equipment which will be welcomed by the modern laboratory is the new 'Bunray' electric Bunsen burner. This infra-red reflex burner, which can be used in any position, vertically, horizontally or upside down, combines all the advantages of the Bunsen burner with the good features of electrical heating. It eliminates the danger of explosions through faulty gas connections and provides a cleaner and

more concentrated heat source. Following the heating up period of approximately one minute, temperatures up to 800° can be reached, and the heating supply can be adjusted by means of an energy regulator, a sliding rheostat or an auto-transformer. The electric Bunsen burner is 6½ in. high with a heavy cast iron base which carries on short insulators the socket into which a 340 watt heating element is plugged. This element is protected against spilling or boiling over by a close-fitting, easily removable quartz sleeve. The highly polished and anodised parabolic cowl of the burner is made from pure aluminium of high corrosion resistance and has a movable lid which makes it easy to clean and remove the heating element.



With a number of small accessories the usefulness of the 'Bunray' can be extended far beyond that of an ordinary gas Bunsen burner. A hot plate attachment consisting of a cast and machined aluminium plate of 4 in. diameter can be fitted directly into the burner top and the burner can be converted into a furnace by the use of a crucible attachment. The electric Bunsen burner can also be used as an infra-red lamp for evaporating liquids from watch glasses or planchettes, making it particularly effective in laboratories using radioactive isotopes. A descriptive leaflet and price list can be obtained from the Shandon Scientific Company, 6 Cromwell Place, London, S.W.7.

ONE of the most commonly specified mechanical properties of steel is the percentage elongation, as found by a tensile test of the material. Unfortunately it is frequently incompletely specified so that anomalous differences exist between the values required by different standards, and the severity of the requirements of a particular standard may vary with the test piece used. For a given carbon, low alloy molybdenum or chrome molybdenum steel having a tensile strength in the range of from 20 to 40 tons per sq. in., the percentage elongation will be the same, when determined from cylindrical or rectangular test pieces of any normal dimensions, provided that for each the gauge length, L , bears a constant ratio to the square root of the cross-sectional area, A .

On this basis the recent revised edition of BS.806 specifies all percentage elongations as measured on a gauge length equal to $4\sqrt{A}$, thus making them directly comparable. This presents no difficulty for circular test pieces, machined all over. For rectangular test pieces, such as those from plates, it is necessary for economy in testing to standardise a few lengths and widths, letting the cross-sectional area vary with the thickness. The percentage elongations so determined are not directly comparable, even with each other. It is therefore necessary to convert them into the equivalent values which would have been found on a gauge length of $4\sqrt{A}$, when all the results are directly comparable. Provision for this has now been made in BS.806:1954, Appendix D, which is based on the analysis of many experimental results. The contents of that appendix have been summarised on a card prepared by Stewarts & Lloyds Ltd., Brook House, Upper Brook Street, London, W.1. It is hoped that by facilitating the conversion of test results to a rational basis and so making them comparable, it will help to rationalise the specifying of percentage elongations in this country.

* * *

SPECIALISING in the application of asbestos to engineering problems, Dick's Asbestos & Insulating Co. Ltd., Thames Road, Silvertown, London, E.16 (a subsidiary of Thos. W. Ward Ltd.), have recently issued a new catalogue. In this are described some of the more outstanding of the well-known Dick's asbestos products—such as packings,

jointings, insulating materials, etc.—in a form which should make their identification and ordering straightforward and mistake-proof. It is emphasised, however, that the company's technical staff is always at the service of the customer for technical assistance and advice; and that the catalogue is compiled principally as a guide, which can be supplemented at any time by specific information on any problem concerning the application of asbestos to engineering.

* * *

THE valuable properties of polytetrafluoroethylene are becoming increasingly recognised (see *THE CHEMICAL AGE*, 1949, 60, 10). The material has zero water absorption, high impact strength and form stability, a far greater resistance to chemicals than either gold or platinum, and retains its strength and dielectric properties at temperatures -100° to $+288^{\circ}$. The electrical losses are substantially constant over a frequency range of 60 c/s to 300 Mc/s and are lower than those of polystyrene or polythene. Its resistance to surface arc-over is good, and, on failing, it vaporises instead of carbonising to leave a conducting path. PTFE in rods, discs, sheets, tape and standard slugs is now available as Ediswan-Clix products, from the Edison Swan Electric Co. Ltd., 21 Bruton Street, London, W.1.

* * *

'FOR the increase and diffusion of knowledge among men,' the 1952 report of the Smithsonian Institution, Washington, contains, in its general appendix, a number of interesting articles of general scientific appeal. Among these are 'Man's Synthetic Future' by Roger Adams, 'Phosphorus and Life' by D. P. Hopkins, and 'Pharmacology of Antibiotics' by Henry Welch.

* * *

SHARPLES CENTRIFUGES LIMITED of Tower House, Woodchester, Stroud, Glos., are now manufacturing in the United Kingdom a wide range of bulk solids separators, in addition to the well-known Sharples Super-Centrifuge. Sharples have published a new bulletin (No. 853/B) describing the field of application of various types of centrifugal separators and indicating the characteristics of each type. The bulletin includes diagrams and illustrations of the construction and mode of operation of the various machines manufactured by the company.

Next Week's Events

MONDAY 22 FEBRUARY

Royal Institute of Chemistry

Gillingham (Kent): Medway Technical College, Gardiner Street, 7 p.m. Film display.

TUESDAY 23 FEBRUARY

Institute of Fuel

London: Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W.1, 5.30 p.m. H. Bardgett: 'Carbonisation of Blends of Coals to Produce Metallurgical Coke.'

WEDNESDAY 24 FEBRUARY

Royal Institute of Chemistry

Norwood: Technical College, Knight's Hill, S.E.27, 6.30 p.m. Dr. W. L. Bedwell: 'The Production of Sulphuric Acid From Calcium Sulphate.'

Society of Chemical Industry

London: Chemical Society's rooms, Burlington House, Piccadilly, 6.30 p.m. Dr. A. H. Cook: 'Unsolved Problems in Brewing.'

Newport (Mon.): Technical College, 7 p.m. Joint meeting with RIC. Speaker from Hilger and Watts: 'Absorptiometry.'

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 2.30 p.m. K. W. Luckhurst: 'The Society's Early Days.'

THURSDAY 25 FEBRUARY

Royal Institute of Chemistry

Dagenham: S.E. Essex Technical College, Longbridge Street, 6.30 p.m. Joint meeting with Technical College Chemical Society. L. C. Myerscough: 'Some Uses of Radio-active Materials in Industry and Medicine.'

Chemical Society

Manchester: The University (Large Chemistry Theatre), 6.30 p.m. Professor H. N. Rydon: 'Some Problems in the Chemistry of Polypeptides.'

Nottingham: The University, 4.45 p.m. Joint meeting with University Chemical Society Lecture by Professor H. C. Longuet-Higgins.

Dundee: The College (Chemistry Dept.), 5.15 p.m. Chemistry Department Lecture, 'Steel,' by Sir Charles Goodeve.

Society of Chemical Industry

Leeds: The University (Chemistry Lecture Theatre), 7 p.m. Joint meeting with

University Chemical Engineering Society. Second Hodsman Memorial Lecture by Dr. D. T. A. Townend.

The Royal Society

London: Burlington House, Piccadilly, 4.30 p.m. A. N. Stroh: 'The Formation of Cracks as a Result of Plastic Flow'; Helen Rae and A. E. Robinson: 'Spiral Growths on Large Crystal Surfaces.'

Fertiliser Society

London: Manson House, 26 Portland Place, W.1, 2.30 p.m. Dr. G. W. Cooke: 'Nitrogen and Phosphate Fertilisers in North-west Europe.'

Institute of Welding

Wandsworth: Technical College, East Hill, S.W.18, 7 p.m. K. K. Doherty: 'The Influence of Welding on Modern Engineering Design.'

FRIDAY 26 FEBRUARY

Chemical Society

St. Andrew's: United College (Chemistry Dept.), 5.15 p.m. Joint meeting with University Chemical Society. Dr. C. H. Bamford: 'The Structure and Properties of Synthetic Polypeptides.'

Southampton: The University (Chemistry Dept.), 5 p.m. Joint meeting with University Chemical Society. Professor G. E. Coates: 'The Chemical Nature of Some Metal Alkyls.'

Institute of Metal Finishing

Sheffield: Grand Hotel, 6.30 p.m. R. A. F. Hammond: 'Stress in Electrodeposits.'

SATURDAY 27 FEBRUARY

Royal Institute of Chemistry

London: Caxton Hall, S.W. 1, 7.30 p.m. Buffet dance with London Section of SCI.

Conference on Oxidation

A conference on 'Unit Processes of Oxidation,' arranged jointly by the Institution of Chemical Engineers, the Chemical Engineering Group of the Society of Chemical Industry, the Chemical Engineering Group of the Koninklijk Instituut van Ingenieurs and the Section for Chemical Technology of the Koninklijke Nederlandse Chemische Vereniging, will be held in The Hague during 6-7 May. Further details may be obtained from the Institution of Chemical Engineers, 56 Victoria Street, London, S.W.1.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

G. & S. G. NEAL LTD., Holbeach, pest controllers. 8 January, £800 charge, to Miss C. M. L. Perry, Kings Lynn; charged on land with warehouse, etc., at Fishpond Lane, Holbeach. *Nil. 25 October, 1952.

HARTON DYEWORKS LTD., Newcastle-on-Tyne. 13 January, £2,000 mortgage, to South Shields Commercial Permanent Building Society (Incorporated); charged on 11 and 12 Station Road, and 23, 24, 25 and 26 Seymour Street, Consett. *£10,260. 14 May, 1953.

LEDA CHEMICALS LTD., London, W. 12 January, mortgage, to City Prudential Building Society securing £1,750 and other moneys, etc.; charged on 1 Middleton Avenue, Chingford. *£6,132. 22 December, 1952.

LUMEX (GREAT BRITAIN) LTD., London, W., luminous paint manufacturers. 13 January, charge, to Barclays Bank Ltd. securing all moneys due or to become due to the bank; charged on factory premises south side Davis Road, Tolworth. *Nil. 31 December, 1952.

RENTOKIL LTD., Fetcham, manufacturers of insecticides, etc. 12 January, £5,500 (not ex.) further charge, to Peckham Mutual Building Society; charged on Dormers, School Lane, Fetcham. *Nil. 22 December, 1952.

VANSUM PRODUCTS LTD., London, W., plastic manufacturers, etc. 12 January, £500 debenture, to W. Held, London; general charge. *Nil. 18 November, 1953.

Satisfactions

HELMER PRODUCTS LTD., plastics manufacturers. Satisfaction. 21 January, of debenture registered 21 March, 1949, to the extent of £178 14s. 5d.

KENT CHEMICAL CO. LTD., Tenterden. Satisfaction, 20 January, of debenture registered 10 August, 1949.

Increases of Capital

The following increases of capital have been announced:—UNIVERSAL - MATTHEY PRODUCTS LTD., from £100 to £540,000; GRAYLANDS & CO. LTD., from £2,000 to £4,000; WELLCOME FOUNDATION LTD., from £1,000,000 to £3,000,000.

Changes of Name

The following changes of name have been announced:—GUARANTEED SANITATION LTD., to W. DAVID & SON LTD., on 5 January; NOTWEN OILS (WESTERN) LTD., to ERNEST NEWTON (WESTERN) LTD., on 4 January; NOTWEN OILS LTD., to NEWTON OILS LTD., on 4 January.

New Registrations

Hemosol Laboratories Ltd.

Private company. (529,110). Capital £100. Manufacturers of and dealers in all kinds of chemicals and chemical substances, etc. First directors to be appointed by the subscribers. Reg. office: 58 Albany Street, London, N.W.1.

Balfour Lecoco Ltd.

Private company. (528,748.) Capital £25,000. To acquire, exploit, sell, licence and develop chemical processes and processes for the carbonisation, distillation and treatment of coal, oil, wood and other mineral substances and for the recovery and processing of all products and by-products therefrom, etc. Directors: Wm. L. Burns, Lindsay Burns, Jr., Alfred C. Bureau, Robin C. Thomson, Ian M. O. Hutchinson, Col. Milner H. Board, Jacques L. de Sahger, Robt. C. Fourmanoit, Jean R. Fourmanoit and Alexandre J. Vilain. Solicitors: Moon, Gilks & Moon. 24 Bloomsbury Square, London, W.C.1.

During the year 1953, there were 28,543 new registrations under the Registration of Business Names Act, 1916, bringing the total number on the Register to 653,531. Twelve prosecutions were instituted during the year for non-compliance with the provisions of the Act. A conviction was obtained in each case.

Company News

British Cellophane Ltd.

British Cellophane Ltd., a subsidiary of Courtaulds Ltd., is to acquire full ownership of Colodense Ltd., which is at present owned jointly by British Cellophane and E. S. and A. Robinson Ltd., manufacturers of packaging materials and printers. Colodense Ltd. make transparent cellulose wrappings.

Blundell Spence & Co. Ltd.

A final dividend of 9 per cent—the same as last year—is being paid by Blundell Spence and Co. Ltd., making 12 per cent—also the same—for the year ended 31 October last. Group profits after all charges, including taxation, totalled £49,741, as compared with £43,614 last year. The UK tax charged amounted to £99,431 (£69,806).

Dunlop Rubber Co. Ltd.

Dunlop's issue of 7,000,000 5½ per cent cumulative preference shares of £1 each at 21s. has been over-subscribed more than three times: 13,163 shareholders and debenture holders applied for 23,955,327 shares. All applications up to and including 400 shares have been allotted in full, after which they have been progressively scaled down.

Pest Control Ltd.

A cocktail party was recently held at the Shelbourne Hotel, Dublin, to announce the appointment of Hugh Moore and Alexanders, Ltd., as sole distributors of Pest Control chemicals and spraying machines for Southern Ireland. Among those present were Mr. P. O'Neil Dunne, director and general manager of Pest Control Ltd.; Mr. J. L. O'Hagen, managing director of Ferguson Ltd., Dublin; Mr. G. M. Goodbody, director of Hugh Moore and Alexanders Ltd.; and Mr. L. Smith. USA agricultural attache. Mr. Goodbody has agreed to join the board of Pest Control (Ireland) Ltd., which is in process of formation.

Market Reports

LONDON.—Activity on the industrial chemicals market continues to be fairly widespread with most sections reporting a good inquiry for new business both on home and export account. Prices generally are unchanged at recent levels, the exception being the chemical compounds of

lead, which include lead acetate and nitrate, which are lower on the reduced price of the metal. The basis price for red lead and litharge is £111 10s. per ton as from 15 February. Business in the coal tar products market remains at a good level with a fair volume of fresh inquiry. The position of pyridines is steady and the export of pitch to the Continent is on a good scale. Naphthalene is firmer on a temporary shortage of supplies. Phenol and metacresol are in good request and the solvents are in strong demand.

MANCHESTER.—The call for contract deliveries of most descriptions of heavy chemicals on the Manchester market during the past week has been on steady lines, with the cotton and woollen textile and allied trades prominent in this respect. There has also been a fair number of fresh inquiries circulating and these have covered a wide range of products. Values generally are on a steady to firm basis. Interest in fertiliser materials continues to show a gradual improvement, and a steady outlet is reported for most of the leading tar products both in the light and heavy sections.

GLASGOW.—Despite a certain amount of dislocation in deliveries, due to adverse weather conditions, trading on the whole has been satisfactory. Prices generally have been steady, apart from lead, where there was a slight variation.

Treating Corrosion

A RAPID method for the easy removal of rust and loosening of badly-corroded bolts and machine parts was demonstrated to representatives of the technical Press on 16 February by the Plus-Gas Co. Ltd., 1-11 Hay Hill, London, W.1. Formula 'A' is a non-corrosive, rapidly-penetrating oily liquid which appears to have some solvent effect upon rust, and the demonstration amply supported the claims made for it. Formula 'B', also made by the company, is a resin-based coating intended for the protection of finished metal surfaces.

HYDROGEN PEROXIDE

Concentrated Qualities Dyestuffs & Chemicals

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CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

CHIEF CHEMIST required by company producing purified and chemical cellulose. Applicant must have cellulose, paper or cellulose derivative experience. This is a senior executive position and applicant should have a First or Second-Class Honours Degree and have occupied positions of responsibility in industry. Work involves responsibility for all technical functions, quality control, development and customer problems. Age 35-45 years. Salary commensurate with position. In first letter state complete record of education and positions held, plus personal data and a small photograph. Reply to **THE GENERAL MANAGER, HOLDEN VALE MANUFACTURING COMPANY, LIMITED, HASLINGDEN, LANCs.**

CHIEF PLANT ENGINEER required by company producing purified and chemical cellulose. Applicant should hold a Degree in Mechanical Engineering and have extensive experience in plant maintenance in the paper mill field. Age 35-45 years. Position is largely maintenance supervision, including steam plant, with emphasis on preventive maintenance and improving mechanical features including instrumentation. Salary commensurate with position. In first letter state complete record of education and positions held, plus personal data including a small photograph. Reply to **THE GENERAL MANAGER, HOLDEN VALE MANUFACTURING COMPANY, LIMITED, HASLINGDEN, LANCs.**

EXPERIENCED CHEMIST required by Northern Rhodesia Company situated on Copperbelt. Applicant must possess University Degree or equivalent qualification and have at least three years' experience. Basic salary will depend on experience of successful applicant, with minimum of £68 monthly, plus bonus (at present 65 per cent of basic salary), and cost-of-living allowance (at present £9 2s. per month.). Married or single accommodation available. Applications to **BOX NO. 443, WALTER SKINNER, LTD., 20, COPTHALL AVENUE, LONDON, E.C.2.**

YOUNG ASSISTANT CHEMIST required by **LAWES CHEMICAL CO. LTD., CREEKSOUTH, BARKING, ESSEX,** "Fertiliser Manufacturers." Experience in analytical methods, some knowledge of soil analysis and the interpretation of the results in relation to general farming practice an advantage. State age, experience and salary required.

FOR SALE

"ALITE" 400 lb. **MIXER** for sale, type GM, opening at bottom of powder chamber 6 in. by 6 in. Electric for 400/440/3/50 supply. **F. J. EDWARDS LTD., 359, EUSTON ROAD, LONDON.**

FOR SALE

A VALUABLE PUBLICATION, issued monthly by Foster D. Snell, Inc., of New York. **"CHEMICAL MARKET ABSTRACTS,"** can now be supplied in this country, and full particulars can be obtained from **DR. M. A. PHILLIPS AND ASSOCIATES, 14, WESTERN ROAD, ROMFORD, ESSEX.**

CHARCOAL, ANIMAL AND VEGETABLE horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830: contractors to H.M. Government.—**THOS. HILL-JONES, LTD., "INVICTA" WORKS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON." TELEPHONE 3185 EAST.**

ECONOMIC BOILERS, 10 ft. Danks. 12,000 lb. evap. 250 lb. pressure; 8 ft. diam. by 14 ft. Paxman. 180 lb. w.p. Twenty others, all sizes.

Whessoe Open Top Riveted Steel MIXING TANK 13 ft. diam., by 15 ft. deep, 9/16 in. plate.

NEW GALVANISED PIPING. Immediate delivery. **TWO** 35 ft. long by 9 ft. diam. Lead-lined **TANKS.**

ONE Stainless CONICAL HOPPER, 7 ft. 3 in. diam., overall depth, 7 ft. 6 in.

TWO Broadbent WATER-DRIVEN CENTRIFUGES, 30 in. diam., 12 in. deep, 1,150 r.p.m., 150 lb. pressure.

SIX O.T. **TANKS**, 7 ft. diam., 14 ft. deep, rubber and brick lined.

Six Aluminium **CONDENSERS**, 14 ft. long by 2 ft. 6 in. diam. 386 Tubes, 1 in. o.d.

FORTY Riveted **RECEIVERS**, 8 ft. 6 in. long, 5 ft. 6 in. diam., 75 lb. w.p.

CAST-IRON PIPES. 400 yds. 8 in. **NEW.** Also most other sizes.

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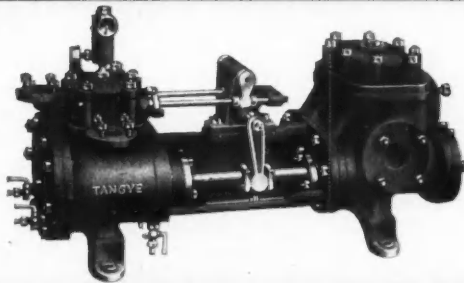
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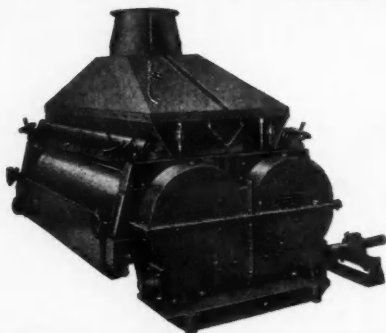


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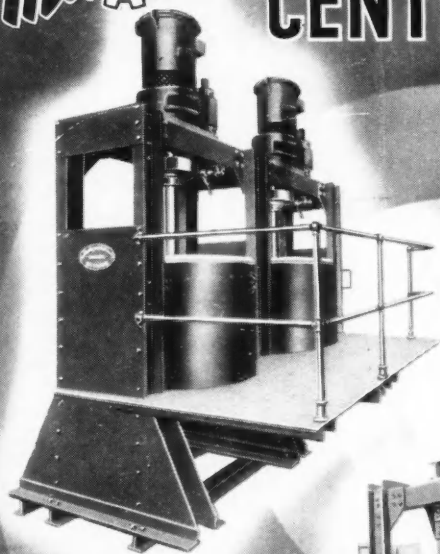


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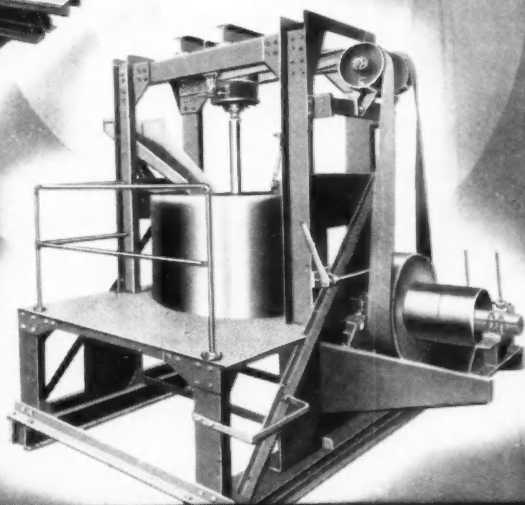


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